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ROMAN KOZŁOWSKI

NOUVELLES OBSERVATIONS SUR LES CORYNOIDIDAE (GRAPTOLITHINA)

Sommaire. — Description est donnée d'un Graptolithe ordovicien nouveau de la famille des Corynoïdidés. Le genre nouveau *Corynites* est établi, dans lequel sont réunies: l'espèce ici décrite sous le nom de *Corynites wyszogrodensis* n. sp. et celle que le présent auteur a décrite en 1953 sous le nom de *Corynoides divnoviensis* Kozł.

INTRODUCTION

En 1953 j'ai publié les résultats d'étude d'une nouvelle espèce du genre *Corynoides* Nicholson (R. Kozłowski, 1953). Les échantillons de cette espèce, décrite sous le nom de *Corynoides divnoviensis* Kozł., ont été extraits d'un galet erratique trouvé sur la côte de la Mer Baltique. En 1955 j'ai recueilli à Wyszogród, dans une moraine affleurant dans la vallée de la Vistule, un galet ordovicien qui m'a fourni des spécimens d'une autre espèce appartenant à ce groupe si particulier de Graptolithes. Ce galet (No. 121) consiste en un calcaire finement grenu, d'un gris très clair. En dehors des Graptolithes, il contenait d'autres organismes à test chitineux, notamment des Chitinozoaires, des Scolécodontes et des Hydrozoaires (?). Parmi les Graptolithes une forme a pu être identifiée spécifiquement, c'est *Dictyonema wimani* Bulman, espèce décrite par O. M. B. Bulman (1933, p. 22) du niveau D_1 de l'Esthonie, qui correspond approximativement au Caradoc moyen de la Grande Bretagne. Notre galet de Wyszogród a donc probablement aussi cet âge.

Les spécimens du Corynoïdidé extraits de ce galet sont tous plus ou moins fragmentaires, aucun ne comprend de rhabdosome entier. Ce sont des tronçons correspondant aux parties proximale, distale et médiane de celui-ci. Ils sont néanmoins assez nombreux pour qu'il soit aisé de reconstituer le rhabdosome entier. Les parties proximale et médiane sont en général plus ou moins aplaties, tandis que la partie distale avec l'ouverture de la sicula conserve le plus souvent sa forme primitive; seuls les bords de l'appareil apertural sont toujours plus ou moins déchiquetés.

Les prosiculas ne sont pas représentées séparément, mais on a pu les étudier dans les parties proximales des rhabdosomes.

L'espèce de Wyszogród, tout comme *C. divnoviensis*, se distingue de toutes les espèces du genre *Corynoides* par la présence d'une seule thèque normale (th *1*) au lieu de deux (th *1* et th *2*). Comme ces deux espèces ont en outre plusieurs autres caractères communs qui les distinguent du genre *Corynoides* Nicholson (génotype *Corynoides calicularis* Nich.), il y a des raisons suffisantes pour les assigner à un genre distinct de la famille des Corynoïdidés. J'appliquerai à ce nouveau genre le nom de *Corynites* n. gen. Sa diagnose sera la suivante:

Corynoïdidé à rhabdosome comprenant, à côté de la sicula, une seule thèque normale (th *1*) et une thèque x enroulée en spirale hélicoïdale. Partie distale de la sicula arquée en forme de crosse, à aperture pourvue d'un appareil apertural très développé.

Corynites n. gen. se distingue surtout de *Corynoides* Nicholson par l'absence de la thèque th *2*, par l'incurvation de la partie distale de la sicula et par l'expansion de son appareil apertural (génotype *Corynites wyszogrodensis* n. gen.).

DESCRIPTION

Corynites wyszogrodensis n. sp.

Diagnose. — *Corynites* à aperture siculaire pourvue de lèvres latérales et ventrales en forme de grands lobes retroussés vers l'extérieur. Lèvres latérales se prolongeant vers l'arrière en forme d'ailettes. Thèque x enroulée en spirale hélicoïdale et dirigée vers le haut. Holotype: fig. 2.

Description (fig. 1). — Le rhabdosome est droit et atteint environ 4,5 mm de longueur, sans compter le néma. Il s'élargit lentement d'arrière vers l'avant et se compose de la sicula qui est la thèque la plus longue du rhabdosome, de la thèque th *1*, adhérente dans toute sa longueur à la paroi ventrale de la sicula et de la petite thèque x, placée au sommet du rhabdosome et dirigée vers le haut.

La partie terminale de la sicula est recourbée vers le côté dorsal, donnant à l'ensemble du rhabdosome l'aspect d'une crosse. La prosicula cylindrique, à sommet conique, atteint sur trois rhabdosomes mesurés les dimensions suivantes (en μ):

	1	*2*	*3*
longueur	600	630	650
largeur à la base	85	85	70

A cause de l'épaississement secondaire, la ligne hélicoïdale dans la paroi de la prosicula se laisse distinguer à peine. Le sommet conique se prolonge

directement en néma. La plus grande longueur du néma observée dans un rhabdosome adulte atteint 900 μ, mais son extrémité y est cassée. L'épaisseur de ce néma dans sa partie médiane mesure 25 μ.

La limite entre la prosicula et la métasicula est marquée d'une mince ligne sombre. La largeur des fusellus de la métasicula augmente graduellement du sommet vers l'aperture. Les premières bandelettes fusellaires ont environ 8 μ de largeur et celles de la partie aperturale — environ 40 μ, l'accroissement est donc quintuple.

Le caractère le plus saillant de la sicula, et presque le seul qui la distingue de la sicula de *Corynites divnoviensis*, réside dans la forme de son appareil apertural (fig. 2). L'aperture même se présente sous forme d'une fente assez étroite, à peu près huit fois plus longue que large, à bords épaissis, plus ou moins parallèles. Les lèvres latérales, ainsi que la lèvre ventrale, sont démesurément développées. Les lèvres latérales s'étendent en larges lobes retroussés vers l'extérieur et se prolongeant vers l'avant par la lèvre ventrale. Vers l'arrière, chaque lèvre latérale se contourne en spirale et se continue ensuite en forme d'une ailette le long de la paroi ventrale de la sicula. Sur les rhabdosomes juvéniles ces ailettes n'existent pas ou sont à peine ébauchées; avec l'âge elles deviennent de plus en plus longues. Chaque lèvre latérale, avec l'ailette qui la prolonge vers l'arrière, est construite de bandelettes fusellaires disposées parallèlement sur toute sa longueur et convergeant vers la lèvre ventrale, où elles se réunissent le long d'une suture en zigzag.

La paroi ventrale de la sicula, légèrement aplatie, est bordée de chaque côté d'un mince bourrelet. Le long de ces bourrelets s'attache la thèque th *1*. Les bourrelets mêmes se continuent en avant de l'aperture de cette thèque jusqu'à sa languette ventrale et encore plus au-delà jusqu'à la base de la languette de la sicula.

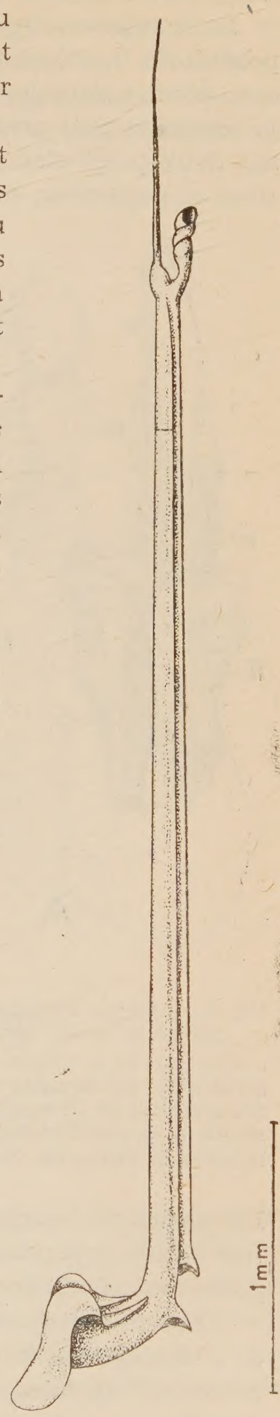

Fig. 1. — *Corynites wyszogrodensis* n. sp. Reconstitution du rhabdosome en vue latérale.

Le bourgeonnement (fig. 3) de la thèque th *1* et de la thèque *x* se produit de la même manière que chez *C. divnoviensis*. Le porus elliptique, allongé dans le sens postéro-antérieur, perfore la paroi ventrale de la prosicula tout près de son sommet, à la base du néma. Sa longueur, sur deux prosiculas, atteint respectivement 70 et 80 μ. Ses bords, antérieur et postérieur, sont épaissis, le premier beaucoup plus que le second.

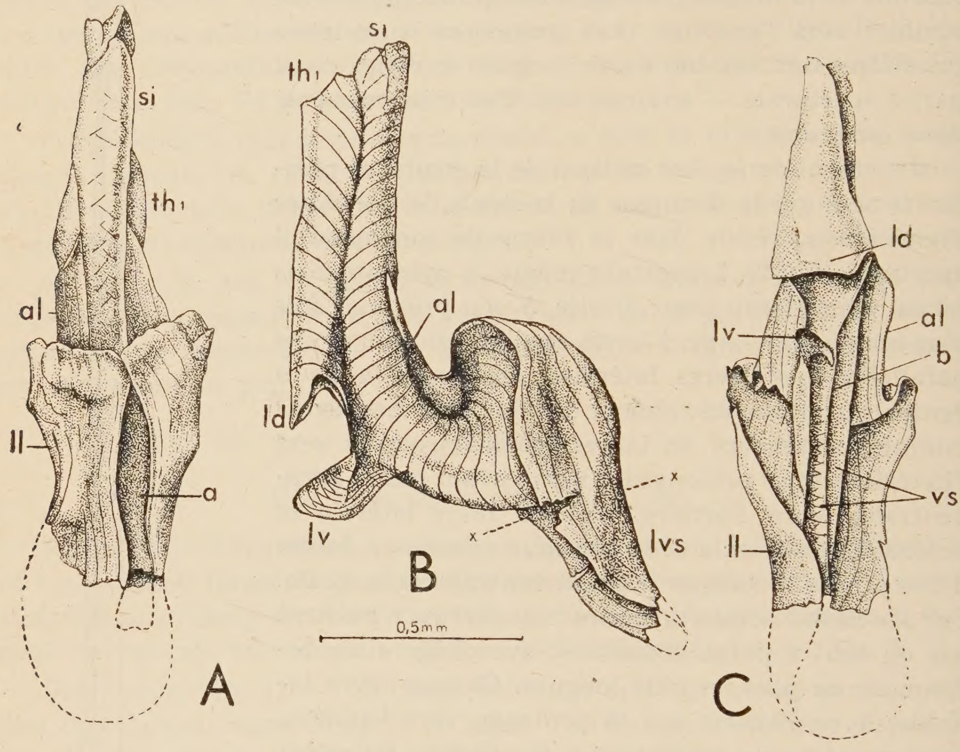

Fig. 2. — Partie terminale d'un rhabdosome adulte; holotype. *A* vue du côté apertural de la sicula, *B* vue de profil, *C* vue du côté apertural de la thèque th *1*
a aperture de la sicula, *al* ailettes des lèvres latérales de la sicula, b bourrelets longitudinaux sur la paroi ventrale de la sicula, *ld* lèvre dorsale de la thèque th *1*, *ll* lèvres latérales de la sicula, *lv* lèvre ventrale de la thèque th *1*, *lvs* lèvre ventrale de la sicula, *si* sicula, th *1* thèque normale, *vs* paroi ventrale de la sicula, *x*-*x* ligne suivant laquelle la languette ventrale de la sicula s'est cassée après l'exécution de la fig. *B*.

Les parois du bourgeon initial, construites au commencement de fusellus très étroits, irréguliers et serrés, sont suivies de fusellus plus larges, disposés concentriquement en longs arcs à largeur graduellement croissante.

Dans cette espèce, tout comme dans *C. divnoviensis*, les thèques th *1* et *x* bourgeonnent entre les lèvres très étendues dans le sens antéro-postérieur du bourgeon initial, la première de ces thèques étant dirigée vers l'avant et la seconde — vers l'arrière.

La thèque x est formée à sa base de fusellus à largeur variable d'un rhabdosome à l'autre, disposés plus ou moins irrégulièrement, sans suture en zigzag. La plus grande partie de cette thèque est enroulée en spirale hélicoïdale, composée de quelques tours réguliers, étroitement appliqués les uns aux autres. Son aperture arrondie se trouve dépourvue de tout processus.

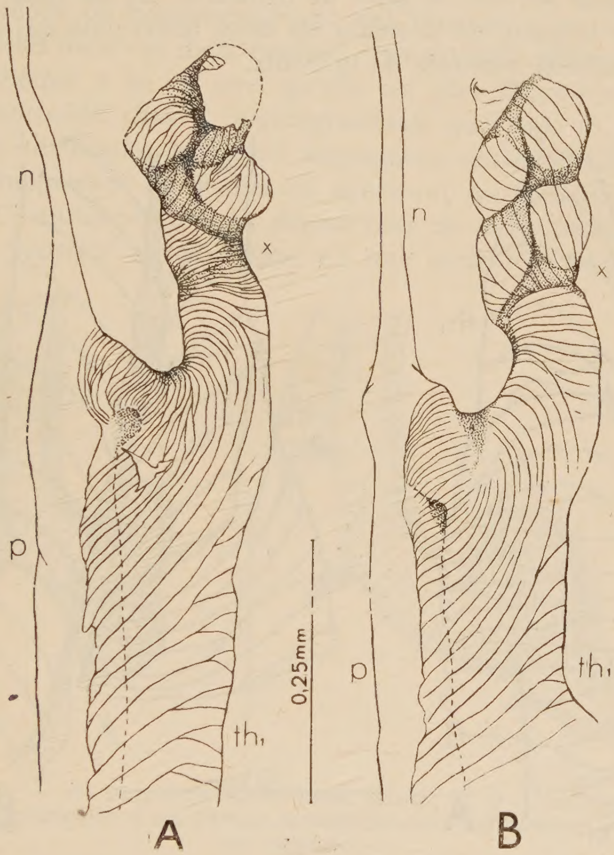

Fig. 3. — *A* et *B* parties proximales de deux rhabdosomes en vue latérale, en lumière transmise *n* néma, *p* prosicula, th *1* thèque normale, x petite thèque enroulée en spirale.

La thèque th *1* est construite de fusellus réguliers, s'engrenant sur sa paroi dorsale le long d'une large suture en zigzag. Son côté ventral, dépourvu de paroi propre, est délimité par la paroi ventrale de la sicula. Son aperture, semi-circulaire, possède une languette dorsale trapézoïdale, bien individualisée, constitutée de fusellus de même largeur que ceux de la paroi dorsale, dont elle forme la continuation. La languette ventrale,

éloignée de l'aperture proprement dite et assise sur la paroi ventrale de la sicula, est liée aux lèvres latérales de l'aperture par l'intermédiaire d'épais bourrelets se continuant sur sa partie basilaire. Cette languette, transversalement convexe sur sa face regardant l'aperture, devient concave sur la face opposée. Elle est formée de fusellus sensiblement plus étroits que ceux de la languette dorsale, disposés régulièrement, avec la suture en zigzag suivant le plan de symétrie. De sa base vers l'avant s'étendent sur la paroi de la sicula les deux bourrelets qui atteignent la base de la languette ventrale de la sicula.

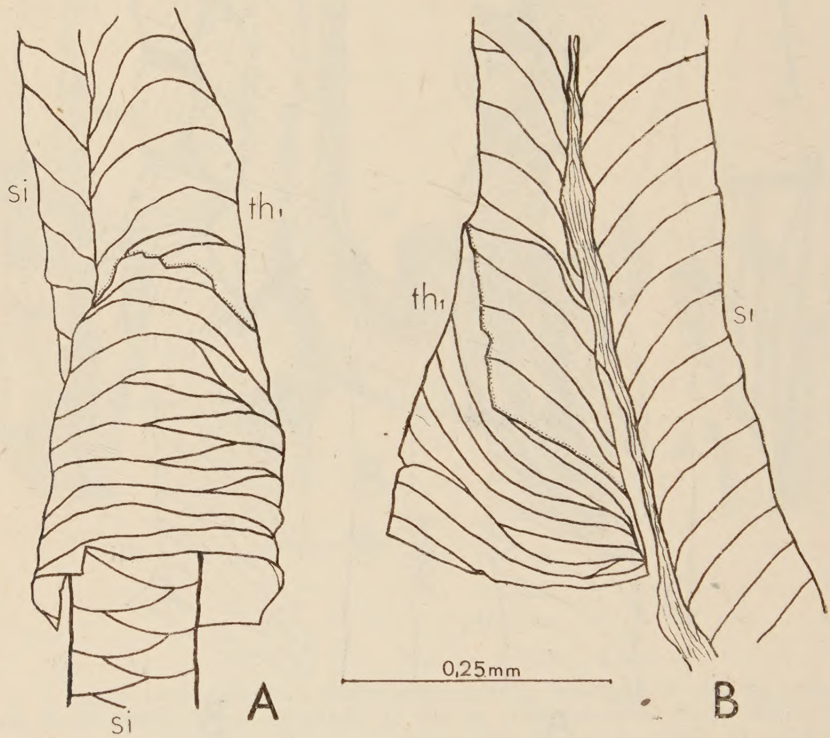

Fig. 4. — Partie terminale de la thèque th *1* régénérée après avoir été cassée suivant la ligne marquée de points; *si* sicula. *A* vue du côté dorsal, *B* vue de profil. (La fissure entre la thèque et la sicula est accidentelle).

Sur un rhabdosome (fig. 4) on peut observer le phénomène de régénération de la partie aperturale de la thèque th *1*. Cette partie s'est régénérée après avoir été cassée suivant une ligne irrégulière sur une étendue d'environ 0,3 mm. Elle se distingue par l'augmentation du diamètre et par l'absence de la languette dorsale, mais il est possible que cette languette n'a pas encore eu le temps de se former.

REMARQUES

L'espèce décrite est sans doute voisine de *Corynites divnoviensis* (Kozł.) (fig. 5*A* et *B*). L'une et l'autre sont caractérisées par l'existence d'une seule thèque normale et par l'aspect de cette thèque, à peu près le même dans les deux cas, sauf, chez *Corynites wyszogrodensis* n. sp., le développement plus grand de la languette dorsale. Le porus, le bourgeon initial, ainsi que le mode de bourgeonnement des thèques *x* et th *1*, sont tout à fait semblables dans ces deux espèces. Une certaine différence est à noter dans la thèque *x* en ce sens qu'elle est plus régulièrement et plus étroitement enroulée chez *C. wyszogrodensis* que chez *C. divnoviensis*. Mais la seule différence vraiment importante entre ces espèces réside dans le développement de l'appareil apertural de la sicula. Les lèvres latérales de *C. divnoviensis* sont dépourvues de toute expansion, tandis que la lèvre ventrale se développe en une sorte d'entonnoir appliqué

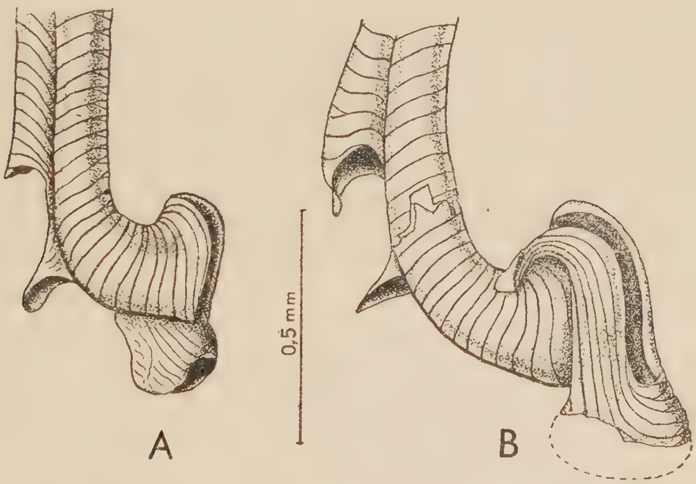

Fig. 5. — *A - Corynites divnoviensis* (Kozł.) et *B - Corynites wyszogrodensis* n. sp. Parties terminales des rhabdosomes en vue latérale.

à la paroi ventrale. Chez *C. wyszogrodensis*, d'autre part, les lèvres latérales aussi bien que la lèvre ventrale s'étendent en forme de grands lobes retroussés vers l'extérieur par rapport à l'ouverture, et les lèvres latérales se prolongent encore vers l'arrière sous forme d'ailettes. On a donc à faire là à deux types bien différents de l'appareil apertural. Néanmoins, il faut prendre en considération le fait que l'appareil apertural correspond en une certaine mesure à un caractère gérontique, car il se forme au cours de la phase finale du développement du rhabdosome. Avant qu'il se soit constitué, les rhabdosomes de ces deux espèces sont pratiquement presque identiques.

La comparaison de nos deux espèces avec toutes celles du genre *Corynoides* fait comprendre que dans les deux cas on a à faire à deux groupes distinctes de Corynoïdidés. Dans nos espèces la thèque x est dirigée vers l'arrière et s'enroule en spirale; par contre, chez les représentants de *Corynoides* de l'Europe et de l'Amérique du Nord, décrits jusqu'à présent, cette thèque se dirige latéralement ou vers l'avant et ne semble trahir aucune tendance à l'enroulement. La thèque th *1* ne se distingue presque pas dans ces deux groupes, bien que, chez *Corynites,* sa languette ventrale, à l'état adulte de cette thèque, reste à une certaine distance de son aperture; chez *Corynoides,* par contre, elle est contiguë à l'aperture. Mais suivant l'observation de O. M. B. Bulman (1947, p. 73-74, fig. 40*E*), faite sur *Corynoides* cf. *gracilis* Hopk. (= *Corynoides calicularis* Nich.), la languette en question au stade juvénile de la thèque th *1* est plaée à une grande distance de son aperture et ce n'est qu'au stade de maturité qu'elle se trouve unie à celle-ci. Comme j'ai eu l'occasion de le remarquer auparavant (Kozłowski, 1953, p. 74 du texte français), *C. divnoviensis* trahit à ce point de vue une certaine tendance à l'arrêt du développement de sa thèque th *1.* La même remarque peut être appliquée à *C. wyszogrodensis.*

La sicula de *Corynites* manifeste, comme il a été dit ci-dessus, d'importantes différences avec la sicula de toutes les espèces de *Corynoides,* autant en ce qui concerne la courbure particulière de sa partie terminale, que le développement de l'appareil apertural. Enfin, la différence la plus facilement saisissable entre ces deux genres consiste dans l'existence de deux thèques normales chez *Corynoides* et d'une seule chez *Corynites.*

Toutes ces différences indiquent que le genre *Corynites* correspond à un stade de spécialisation sensiblement plus avancé que le genre *Corynoides,* ce qui se manifeste par la disparition de la thèque th *2,* par le raccourcissement de la thèque th *1,* par la courbure de la partie terminale de la sicula, par le développement compliqué de son appareil apertural, ainsi que par le retournement et l'enroulement de la thèque x.

On ne connaît pas de formes intermédiaires entre *Corynoides* et *Corynites.* Mais l'état de connaissance de ce groupe, si particulier, des Graptolithes est encore très imparfait. Il est donc impossible de repondre actuellement à plusieurs questions qui se posent en ce qui concerne son origine et son évolution. Aucun terme de passage n'est connu entre la sicula droite de *Corynoides* et la sicula courbée de *Corynites,* ni entre l'appareil apertural simple de la première et l'appareil compliqué de la seconde. On ne sait pas, si la disparition de la thèque th *2* s'est faite tout d'un coup ou bien si elle s'est produite graduellement. Le rôle biologique de la thèque x reste toujours mystérieux et son homologie — incertaine. En ce qui concerne l'enroulement spiral de cette thèque, il est à remarquer qu'un phénomène analogue a été constaté chez *Tubidendrum bul-*

mani Kozł. et chez *Dendrotubus wimani* Kozł. (Kozłowski, 1949, p. 162, fig. 50 et p. 155, fig. 44). On y a donc probablement à faire à une tendance propre à différents Graptolithes.

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Warszawa, juillet 1956

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ROMAN KOZŁOWSKI

NOWE OBSERWACJE NAD CORYNOIDIDAE (GRAPTOLITHINA)

Streszczenie

Notatka poświęcona jest opisowi nowego gatunku przedstawiciela graptolitów z rodziny Corynoididae, którego okazy wypreparowane zostały z wapiennego głazu narzutowego wieku ordowickiego, znalezionego nad Wisłą koło Wyszogrodu.

Ustanowiony zostaje nowy rodzaj *Corynites* n. gen. dla tego gatunku, nazwanego *Corynites wyszogrodensis* n. sp., oraz dla gatunku opisanego przez autora w 1953 r. pod nazwą *Corynoides divnoviensis* Kozł.

Corynites n. gen. różni się od *Corynoides* Nicholson brakiem teki th 2, zagięciem w kształcie pastorału części terminalnej sikuli oraz swoiście wykształconym aparatem aperturalnym sikuli.

U *C. divnoviensis* (Kozł.) aparat aperturalny ma kształt lejka powstałego ze zwiniętej wargi wentralnej, u *C. wyszogrodensis* n. sp. natomiast składa się on z rozrośniętych i odwiniętych na zewnątrz warg lateralnych oraz wargi wentralnej, przy

czym wargi lateralne przedłużają się ku tyłowi w postaci skrzydełkowatych blaszek. Na uwagę zasługuje też zjawisko spiralnego skręcenia małej teki *x*, szczególnie zaakcentowane u *C. wyszogrodensis* n. sp. Zarówno homologia jak i rola biologiczna tej swoistej teki pozostają dotychczas niewyjaśnione.

Corynites odpowiada etapowi wyższej specjalizacji, niż *Corynoides*. Wyraża się to zanikiem teki th *2* oraz swoistym wykształceniem terminalnej części sikuli i jej aparatu aperturalnego. Formy pośrednie między *Corynoides* i *Corynites* nie są znane.

OBJAŚNIENIA DO ILUSTRACJI

Fig. 1 (p. 261)

Corynites wyszogrodensis n. sp. Rabdozom widziany z boku; rekonstrukcja.

Fig. 2 (p. 262)

Część terminalna dorosłego rabdozomu, holotyp. *A* okaz widziany od strony aperturalnej, *B* id. — z profilu, *C* id. — od strony aperturalnej teki th *1; a* apertura sikuli, *al* skrzydełka warg lateralnych sikuli, *b* listewki podłużne na wentralnej ścianie sikuli, *ld* warga dorsalna teki th *1*, *ll* wargi lateralne sikuli, *lv* warga wentralna teki th *1*, *lvs* warga wentralna sikuli, *si* sikula, th *1* teka normalna, *vs* ściana wentralna sikuli, *x-x* linia wzdłuż której oderwał się języczek wargi wentralnej po wykonaniu rysunku *B*.

Fig. 3 (p. 263)

A i *B* części proksymalne dwóch rabdozomów, widziane z boku w świetle przechodzącym; *n* nema, *p* prosikula, th *1* teka normalna, *x* mała teka spiralnie skręcona.

Fig. 4 (p. 264)

Część terminalna teki th *1* zregenerowana po odłamaniu się wzdłuż linii zaznaczonej kropkami; *si* sikula. *A* od strony dorsalnej, *B* z profilu. (Szczelina między teką a sikulą — przypadkowa).

Fig. 5 (p. 265)

A — *Corynites divnoviensis* (Kozł.) i *B* — *Corynites wyszogrodensis* n. sp. Części terminalne rabdozomów widziane z boku.

РОМАН КОЗЛОВСКИ

НОВЫЕ НАБЛЮДЕНИЯ НАД CORYNOIDIDAE (GRAPTOLITHINA)

Резюме

Настоящая заметка посвящена описанию нового вида представителя граптолитов, семейства Corynoidae, образцы которого были отпрепарированы из валуна ордовикского известняка, найденного у р. Вислы близь Вышогрода.

Установлен новый род *Corynites* n. gen. для этого вида, названного *Corynites wyszogrodensis* n. sp., равно как и для вида, описанного автором в 1953 г. под названием *Corynoides divnoviensis* Kozł.

Corynites n. gen. отличается от *Corynoides* Nicholson отсутствием теки th *2*, изогнутием терминальной части сикули, в виде посоха, а также своеобразно сформированным апертурным аппаратом сикули.

У *C. divnoviensis* (Kozł.) апертурный аппарат имеет вид воронки, возникшей из свернутой вентральной губы, между тем как у *C. wyszogrodensis* n. sp. он состоит из разросшихся и развернутых наружу латеральных губ и вентральной губы, причем латеральные губы протягиваются к задней части в виде крылышковидных пластинок. Заслуживает внимание также спиральное изогнутие малой теки *x*, особенно подчеркнутое у *C. wyszogrodensis* n. sp. Как гомология так и биологическая роль этой своеобразной теки остаются пока не выясненными.

Corynites соответствует этапу высшей специализации по сравнению с *Corynoides.* Выражено это исчезновением теки th *2*, а также своеобразным сформированием терминальной части сикули и ее апертурного аппарата. Промежуточные формы между *Corynoides* и *Corynites* неизвестны.

A C T A P A L A E O N T O L O G I C A P O L O N I C A
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MARIA RÓŻKOWSKA

PACHYPHYLLINAE FROM THE MIDDLE DEVONIAN OF THE HOLY CROSS MTS.

PART I

Abstract. — *Protomacgeea dobruchnensis* n. gen. & n. sp. is described, being the most ancient representative of the subfamily of Pachyphyllinae recorded in Poland from the Middle Couvinian beds of Grzegorzowice and Wydryszów. New species *Thamnophyllum skalense* and subspecies *Thamnophyllum trigemme pajchelae* have been described from the Givetian besides the already known species *Th. caespitosum* (Goldfuss) and *Th. trigemme* (Quenstedt). The writer has referred to *Macgeea bathycalyx bathycalyx* (Frech) all the representatives of the genus *Macgeea* from the Givetian of Skały, establishing, however, the following new subspecies: *M. bathycalyx kasimiri, M. bathycalyx josephi, M. bathycalyx regularis, M. bathycalyx longiseptata,* as well as one new mutation *M. bathycalyx amabilis.* These subspecies and the mentioned mutation are considered congeneric on their common ontogeny and essentially similar morphology. A new species of colonial form, displaying horse-shoe dissepiments and symmetrical fans in trabeculae, has been recorded from the Middle Givetian coral reef and described under the name of *Pachyphyllum sobolewi.*

INTRODUCTION

This paper is a contribution to the team research study undertaken to investigate the Devonian fauna from the „Grzegorzowice-Skały-Włochy" section of the Holy Cross Mts. The writer has been allotted the task of working out the tetracoral fauna, with special reference to the subfamily of Pachyphyllinae.

A part of my study, dealing with Pachyphyllinae from the Upper Devonian of the Kielce region, was published in 1953. The present paper is concerned with the description of forms belonging to subfamily Pachyphyllinae, recorded from Middle Devonian beds. Forms from the Givetian stage were collected in 1946 and during 1953-54 at the locality of Skały, while the Couvinian specimens were recovered at the localities of Grzegorzowice and Wydryszów in the years 1953 and 1954 in the course of geologic field work done by Mrs. M. Pajchel.

In Poland, the oldest representatives of the subfamily Pachyphyllinae are recorded from Middle Couvinian, the youngest — from the Upper Frasnian. None of this group pass into the Famenian — as has thus far been ascertained by the writer. All the evolutionary stages of Pachyphyllinae, therefore, fit into the Middle Couvinian up to the Upper Frasnian.

Besides a description of the lithology of the investigated formations the present paper in the first place describes species and varieties occurring in the Middle Devonian of the Holy Cross Mts. All the more general problems which follow the study on the Pachyphyllinae, such as their variability, phylogeny, palaeogeography, palaeoecology etc., will be dealt with in the second part of this work.

The present work has been performed at the Palaeozoological Institute of the Polish Academy of Sciences (Poznań Branch). Thanks are due to all those who have helped collecting the material and cutting the thin sections.

The writer also most sincerely thanks Professor R. Kozłowski for his critical remarks on the manuscript, Mrs. M. Pajchel for her stratigraphic suggestions and her geological sketch, Mrs. J. Gruszczyńska for the drawings done from photograph pictures of the thin sections. Thanks are also due to Mrs. J. Humnicka for the pains taken in translating the present paper into English.

LITHOLOGICAL AND FAUNAL CHARACTERS

Protomacgeea dobruchnensis n. gen. & n. sp., the oldest representative of the Pachyphyllinae, is recorded in Poland from the Middle Couvinian of Grzegorzowice and Wydryszów. From the strongly detrital marls of Grzegorzowice (beds No. 2)* the writer has collected 35 specimens of this most interesting form. The rock there is crowded with shell fragments of Brachiopoda, twigs of Tabulata and colonies of Bryozoa. Of the tetracorals are present: *Pseudozonophyllum excentricum* Różk. (49 specimens), *Breviphrentis multiseptatus* (Gürich) (104 specimens), and the index form *Rhopalophyllum heterophyllum* (E. & H.) (29 specimens). On this latter form, the Middle Couvinian age — the *K* horizon of R. Wedekind's (1924) stratigraphic column — is assigned to these beds. Since specimens of *P. dobruchnensis* are not abraded and have occasionally been preserved complete, it is inferred that they are parautochtonic.

Bituminous limestones make up the slightly higher horizon of beds No. 3. Marls grade into limestones. Scarcity of detritus is characteristic of less marly limestones. Corallites of *P. dobruchnensis* (147 specimens)

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* For numbers of beds — see fig. 1, p. 273.

Fig. 1. — Geological sketch-map of the Grzegorzowice-Skały region (after M. Pajchel).

are here beautifully preserved with calice and proximal end, consequently suggesting preservation in their original biotope. The associated fauna consists of rare cephalopods, trilobites, ostracods, branchy Tabulata and brachiopods. Crinoidal fragments are common. *Blothrophyllum irregulare breviseptata* Róžk., with 99 specimens, and *Pseudozonophyllum excentricum* Różk., with 253 specimens, predominate among the tetracorals.

The „Couvinian" stage from Wydryszów was worked out in detail by J. Czarnocki (1950) including the stratigraphical and lithological sections, also a description of the faunal assemblage. Nine groups of layers were differentiated by this author, of which No. 6 is noteworthy and is defined as „marly, brittle, yellowish shales containing *Fenestella*, approx. 6 m in thickness". Excavating work carried out at that site in 1955 yielded a beautifully preserved fauna with great quantities of tetracorals and Tabulata. Genus *Heliolites* is also represented. Trilobites are very abundant (*Phacops* sp., *Scutellum* sp., *Proetus* sp.). Ostracods show a satisfactory state of preservation. These beds are characteristic by the copiousness of Bryozoa belonging to family Fenestellidae. Molluscs, as is the rule in Devonian deposits, are less common (*Loxonema* sp., *Pleurotomaria* sp., *Aviculopten* sp., *Cyrtoceras* sp.). Brachiopods are also less plentiful. Among the tetracorals, frequent occurrence is noted of minute and completely preserved corallites: *Metriophyllum gracile* Schlüter, with 30 specimens, of which the largest 7 mm in length; also *Protomacgeea dobruchnensis* n. sp., with 30 specimens. The larger tetracorals are mostly damaged, they are: *Breviphrentis multiseptatus* (Gürich), with 53 specimens, *Pseudozonophyllum excentricum* Róžk., with 10 specimens; *Rhopalophyllum heterophyllum* (E. & H.), with 6 specimens; *Pseudozonophyllum halli* Wedekind, with 1 specimen. The coral assemblage very closely approaches the Middle Couvinian fauna from the marls and limestones of Grzegorzowice. An element new to it is represented by *Metriophyllum gracile*, a species characteristic of the marly facies and widespread in the Givetian from Skały. According to C. Schlüter (1889) and F. Frech (1886), it is yielded already by the higher horizon from the Couvinian of the Eifel Mts. The corals *P. dobruchnensis* and *M. gracile*, found in a good and complete state of preservation, have probably been preserved in their original biotope within the detrital marls of Wydryszów, while corals of larger dimensions, always damaged, have possibly been transported here.

Opposite the Grzegorzowice mill and overlying the limestone described by G. Gürich (1896) is an unfossiliferous dolomite complex, several hundred meters in thickness (beds No. 4a). It has been assigned to the „Eifelian" by J. Czarnocki (1950).

The overlying dolomite complex contains numerous banks with *Amphipora ramosa;* its central portion shows a limy bank crowded with shells of the brachiopod *Bornhardtina skalensis* Biernat (1953). These strata have by J. Czarnocki (1950) been referred to the Lower Givetian (beds No. 4b).

Calceola limestones (beds No. 5) with an extremely copious coral fauna occur in the top of the dolomites at Skały. These limestones are grey with a cherry hue, strongly organogenic. According to A. Stasińska (personal communication) globose colonies of *Alveolites taenioformis* Schlüter predominate among the Tabulata. Laminar *Coenites escharoides* (Steininger) are also common. Tetracorals occur as solitary forms only. The predominant species is *Calceola sandalina* L., with 285 specimens, while *Thamnophyllum skalense,* with 155 specimens, is also fairly frequent. Other forms are represented rather sporadically, e. g. *Macgeea bathycalyx josephi,* by 3 specimens; *M. bathycalyx longiseptata,* by 1 specimen; *Neostringophyllum* sp., by 6 specimens; *Campophyllum soetenicum* Schlüter, by 20 specimens; *Metriophyllum gracile,* by 5 specimens. The *Calceola* limestones are strongly detrital, with abundant fragments of minute shells and skeletons of corals. The occurrence of a reef in that site is attested by great quantities of complete globose Tabulata. This was not, however, a compound reef, but a carpet-like reef. The extreme rarity of stromatoporoid colonies suggests that the coral fauna there had subsisted either in a somewhat deeper sea or in waters less pure than those natural to the recent reef-building hexacorals (M. Lecompte, 1954).

Brachiopod shales have already been described (beds No. 6) by L. Zeuschner (1869), G. Gürich (1896), D. Sobolew (1904), M. Pajchel (paper in press). On *Calceola* limestones rest muddy, marly shales with thin intercalations of marls. They contain a markedly plentiful assemblage of brachiopods. Plate of crinoids and colonies of Bryozoa are frequent. The following species of trilobites have among others been described by Z. Kielan (1954) from these beds: *Phacops sobolewi* Kielan, *Otarion polonicum polonicum* Kielan, *Dechenella polonica* Gürich. Ostracods are abundant. Corallites are of diversified form but always minute. The writer has identified the following species belonging to that group: *Blothrophyllum skalense* Gürich, with 25 specimens; *Metriophyllum gracile* Schlüter, with 25 specimens; *Depasophyllum intermedium* Gürich, with 9 specimens; *Calceola sandalina* L., with 7 specimens; minute forms from genus *Nardophyllum,* with 30 specimens; *Ceratophyllum typus skalense* Gürich, with 18 specimens; *Heliophyllum halli* E. & H., with 5 specimens; *Diplochone striata* Frech, with 3 specimens. From the subfamily of Pachyphyllinae have been here collected: *Thamnophyllum trigemme*

(Quenstedt), with 14 specimens; *Macgeea bathycalyx kasimiri,* with 23 specimens; *M. bathycalyx josephi,* with 11 specimens. The fauna of tetracorals occurs here in its original biotope, as is suggested by the usually fine preservation of its specimens, with calicular margin and proximal end undamaged. Some specimens, on being cleaned from mud by means of H_2O_2, give the appearance of recent corallites. Mudstones and argillaceous shales, and the association of minute organisms indicate sedimentation under calm sea conditions. The presence of representatives of *Nardophyllum* suggests Middle Givetian age (after R. Wedekind, 1925).

Higher up occur beds of argillaceous, thinly laminated, detrital shales with thin intercalations of marl crowded with crinoid plates. *Microcyclus eifeliensis* Kayser, with 25 specimens, so characteristic of this fácies, together with *Calceola sandalina,* with 1 specimen, and *Metriophyllum gracile,* with 6 specimens, are recorded from these strata.

Almost all of the above mentioned tetracoral species are encountered in beds No. 8 consisting of mudstones and marls. One form not mentioned before is *Aulacophyllum* sp., with 18 specimens. The predominant forms here are: *Nardophyllum tenue* Wdkd., with 28 specimens; *Mesophyllum defectum* (Schlüter), with 30 specimens; *Lithophyllum corneolum* Wdkd., with 200 specimens. *Scoliophyllum lamellosum* Goldf., with 6 specimens, and *Pseudocosmophyllum* aff. *geigeri* Wdkd., with 10 specimens, are more rare. The Pachyphyllinae are represented by the following forms: *Thamnophyllum caespitosum* (Goldf.), with 15 specimens; *M. bathycalyx josephi,* with 53 specimens; *M. bathycalyx kasimiri,* with 10 specimens; *Thamnophyllum trigemme,* with 28 specimens.

Tetracorals are extremely rare in beds No. 9, built up of thickly-bedded limestones and marls crowded with crinoids. The only specimen of tetracorals collected here is that of *Pseudocosmophyllum* aff. *geigeri.*

Overlying these beds are marls, mudstones and limestones, also laminar shales (beds No. 10), markedly poor in corals. Somewhat more abundant are corallites from species *Nardophyllum excentricum* Wdkd., with 29 specimens, and *Sparganophyllum simplex* Wdkd., with 9 specimens. The Pachyphyllinae are represented by *M. bathycalyx josephi,* with 3 specimens, and *Thamnophyllum trigemme,* with 15 specimens.

Marly, argillaceous shales, with strongly sandy lens, occur in the top of this series (beds No. 11). In the midst of the shales a bank is encountered with an abundant fauna of bryozoa (*Fenestella* sp.) and of brachiopods. Quite numerous are Lamellibranchiata and Gastropoda such as *Leda* sp., *Nucula* sp., and *Pleurotomaria* sp. The branched *Thamnopora* sp. predominates in the Tabulata. The tetracorals are mostly small and well preserved, having probably been preserved in their original environment. The following species have here been recorded by the writer: *Calceola*

sandalina, with 1 specimen; *Metriophyllum gracile,* with 10 specimens; *Nardophyllum* sp., with 13 specimens; *Lithophyllum* sp., with 4 specimens; *Depasophyllum intermedium,* with 2 specimens. *Thamnophyllum trigemme pajchelae* n. subsp., with 120 specimens, and *M. bathycalyx amabilis* n. mut., with 56 specimens, are here among the Pachyphyllinae.

Mauve marls (beds No. 12), containing an abundant fauna of corallites collected mostly from weathered layers, lie in the top of strata with marly shales. In addition to *Heliolites* sp. and the Tabulata *Thamnopora* sp., large corallites have been collected of the following forms: *Breviphrentis multiseptatus,* with 14 specimens; *Nardophyllum* sp., with 5 specimens; the predominant forms here are the enormous, very beautiful, solitary or budding *Heliophyllum halli,* with 100 specimens, and *Scoliophyllum lamellosum,* with 6 specimens. Of the Pachyphyllinae we have here: *Th. trigemme,* with 72 specimens; *M. bathycalyx josephi,* with 5 specimens. To the top the marls grade into thickly bedded crinoidal limestones, overlaid by loamy shales with minute brachiopods.

Thickly bedded, coral bearing limestones (beds No. 13) lie in the top of this highly differentiated lithological series, in association with extensive colonies of *Hexagonaria hexagona* (Goldfuss) (4 specimens) and some of the largest of the hereto known solitary corallites, namely *Pseudocosmophyllum geigeri* (2 specimens), up to 11 cm in diameter, *Nardophyllum* aff. *acutum* Wdkd. (4 specimens), and *Breviphrentis multiseptatus.* The coral colonies indicate the presence of a reef.

The coral limestones are overlaid by thick strata of argillaceous sandy sediments (beds No. 14), which occasionally yield remnants of plants and must therefore have been deposited near a continent. These strata have by J. Czarnocki (1950) been named the „Świętomarz series".

Outcrops of the so called „Pokrzywianka series" (beds No. 15) (J. Czarnocki, 1950) are observable along the roadway leading from Włochy to Skały, also on the hill rising to the north of the village of Pokrzywianka Dolna. A reef, called „Kamieniec", is partly exposed near the roadside on the way to Skały. These Pokrzywianka series consist of thickly-bedded, strongly fissured limestones, with an E — W strike. The numerical predominance here falls to the large, globose stromatoporoids, while tetracorals, brachiopods and Tabulata are less numerous. This reef has probably been formed in pure, agitated waters, at a depth similar to that of recent coral reefs. Devonian reefs showing similar assemblages have been described from Ardennes by M. Lecompte (1954). A number of cuts intersecting the reef has disclosed certain lithological and faunal variations indicating changes in the bottom depth. The nearest horizon is occupied by compact, bituminous limestones, partly exposed, 40 cm in thickness, with an abundant fauna of Tabulata: *Chaetetes regularis* Le-

Lithology of Givetian beds from Skały and occurrence of characteristic forms of corals

Lithological facies	No. of beds	Predominant coral species	Predominant species of Pachyphyllinae
Argillaceous shales of the Nieczulice series	16		
Reef limestones of the Pokrzywianka series	15	*Schizophyllum acanthicum* Frech, *Breviphrentis multiseptatus* Gürich	*Pachyphyllum sobolewi* n. sp.
Świętomarz argillaceous sandstones	14		
Coral limestones	13	*Hexagonaria hexagona* (Goldfuss), *Pseudocosmophyllum geigeri* Wdkd.	
Marls and limestones	12	*Heliophyllum halli* E.&H.	*Thamnophyllum trigemme* (Quenstedt)
Shales: argillaceous-marly, detrital, with sandy lens	11	*Metriophyllum gracile* Schlüter	*Macgeea bathycalyx amabilis* n. mut., *Th. trigemme pajchelae* n. subsp.
Thinly laminar shales, marls and limestones	10	*Nardophyllum excentricum* Wdkd., *Sparganophyllum simplex* Wdkd.	*Th. trigemme* (Quenstedt)
Limestones and crinoidal marls	9		
Mudstones and calcareous marls	8	*Lithophyllum corneolum* Wdkd., *Nardophyllum tenue* Wdkd., *Mesophyllum defectum* Schlüter	*Macgeea bathycalyx josephi* n. subsp., *Th. caespitosum* (Goldf.), *Th. trigemme* (Quenstedt)
Marly shales	7	*Microcyclus eifeliensis* Kayser	
Limestones, marls, marly shales	6	*Nardophyllum* sp., *Ceratophyllum typus* Gürich, *Blothrophyllum skalense* Gürich	*Macgeea bathycalyx kasimiri* n. subsp., *Th. trigemme* (Quenstedt)
Calceola limestones	5	*Calceola sandalina* L.	*Th. skalense* n. sp.
Dolomites and limestones	4	*Amphipora ramosa*	

compte, *Alveolites tenuissimus* Salée. Overlying these are platy limestones, intercalated with layers of marly limestone containing numerous solitary tetracorals, Tabulata and brachiopods. The overlying compact limestone, 9 m in thickness, contains in its top part rubble limestone of ashy-red colouration. It consists mainly of globose stromatoporoids which make up 90 percent of the fauna here, in association with such forms of the Tabulata as *Chaetetes rotundus* Lecompte, *Alveolites suborbicularis*, *Heliolites* sp., while in the central part sporadical occurrence is noted of enormous colonies of *Pachyphyllum sobolewi*, 60 cm long. Solitary tetracorals are less frequent but extremely large, e. g. *Breviphrentis multiseptatus*, 70 mm in diameter, and big brachiopods from genus *Atrypa* and *Pentamerus*. Similar fauna is yielded by Pokrzywianka reef limestones outcropping on a hill to the north-east of the Miłoszów forest. These limestones are ashy-red, strongly bituminous, clastic, with thick calcite veins. The coral assemblage bears common resemblances in all exposures. To say, most copious are forms of *Schizophyllum acanthicum* Frech (62 specimens); *Sparganophyllum* sp. with axial ends of septa distinctly spiral (23 specimens); huge specimens of *Breviphrentis multiseptatus* (23 specimens). Quite rare, on the other hand, are forms belonging to genera *Lithophyllum* (3 specimens), *Nardophyllum* (1 specimen), *Neostringophyllum* (5 specimens). Plocoid Pachyphyllinae have not before been recorded from Middle Givetian layers (horizon containing *Sparganophyllum* with spirally coiled septa, after R. Wedekind's stratigraphic column, 1925). This form is described here under the name of *Pachyphyllum sobolewi* n. sp. (with 13 platy colonies). Phaceloid Pachyphyllinae are extremely rare, with one specimen only of *Thamnophyllum caespitosum*.

On the Pokrzywianka series rest the so called „Nieczulice shales" which are barren of corals (beds No. 16).

The whole complex of sedimentary rocks in the above described profile has an E — W strike and a NNE dip from 40^0 to 45^0.

SYSTEMATIC DESCRIPTIONS

Owing to paucity of occurrence Pachyphyllinae occupy an exceptional position among the numerous, strongly differentiated forms of tetracorals. In some places only are they present in fair abundance, though displaying monotony. This is the case for instance in the Couvinian marls and limestones from Grzegorzowice (beds Nos. 2, 3) and Wydryszów, where *Protomacgeea dobruchnensis* predominates. In beds No. 5 of the Givetian limestones, *Thamnophyllum skalense* takes the numerical lead. Species *Th. trigemme pajchelae* is abundant in the marly-arenaceous shales (beds No. 11), while fairly numerous colonies of *Pachyphyllum*

sobolewi are recorded from the reefs of Kamieniec (beds No. 15) and Pokrzywianka. Outside of these occurrences Pachyphyllinae are exceeded in numbers by other tetracorals.

A description of the following forms of Pachyphyllinae is given in the present paper:

Protomacgeea dobruchnensis n. gen. & n. sp.
Macgeea bathycalyx bathycalyx (Frech)
M. bathycalyx kasimiri n. subsp.
M. bathycalyx josephi n. subsp.
M. bathycalyx regularis n. subsp.
M. bathycalyx longiseptata n. subsp.
M. bathycalyx amabilis n. mut.
Thamnophyllum skalense n. sp.
Th. caespitosum (Goldfuss)
Th. trigemme (Quenstedt)
Th. trigemme pajchelae n. subsp.
Pachyphyllum sobolewi n. sp.

Genus *Protomacgeea* n. gen.

Genotype: *Protomacgeea dobruchnensis* n. sp. (fig. 2-4).

Diagnosis. — Small simple corallites, of elongate conical form, entirely covered by epitheca. Calyx profound, attaining more than half the height of the corallite. Major septa usually much dilated by stereome [1], discontinuous (peripheral parts separated from the axial by conical compact stereozone) and proximally occupying nearly the entire lumen of the corallite, but short distally. The cardinal septum has suffered almost complete reduction being replaced by the fossula. Counter septum long. Minor septa do not extend beyond the area of flat dissepiments. Tabulae complete or incomplete, horizontal or concave, strongly dilated. Pedicel present. The supremacy of the counter septum and abortion of cardinal septum persist throughout the ontogeny. Septal microstructure is trabecular, the arrangement of trabecular granules fan-like on sides of septa.

Remarks. — The above form has been established into a new genus, allied with genus *Macgeea*, on its horizontal dissepiments and conical corallite without buds. It has not been possible directly to ascertain the presence of the fan systems of trabeculae, but this is indicated by the fan-like arrangement of trabecular granules on sides of septa. Characters distinguishing *Protomacgeea* from *Macgeea* are presence of pedicel, absence of horse-shoe dissepiments, radial and vertical discontinuity of septa. Moreover, the epitheca does not terminate, as usual, a few millimeters below the calicular margin, but projects over the margin.

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[1] „*Stereome* is a layer of calcareous material of variable thickness laid down secondarily on septa and similar structures" (R. R. Shrock & W. H. Twenhofel, 1953, p. 139).

Protomacgeea dobruchnensis n. sp.

(fig. 2-8)

1954. *Thamnophyllum* aff. *stachei* Penecke; M. Różkowska, Badania..., p. 233-235. fig. 27, 28.

Holotype: fig. 2-4.

Material. — 35 specimens, mostly damaged, from the marls of Grzegorzowice; 147 specimens were polished from the bituminous limestones of Grzegorzowice; their light skeletons show off distinctly against the dark rock background. About 30 specimens have been collected from the marly shales of Wydryszów, in some cases it was possible to recover them entire from the surrounding rock. 38 transverse and longitudinal thin sections were prepared.

Diagnosis. — Small, simple conical corallites, completely covered by epitheca and provided with a pedicel. Most usual length 15 mm, diameter 4-5 mm, number of septa 32-42. Maximum number of septa — 58, with diameter of 9 mm. A row of horizontal dissepiments between the epitheca and the stereozone [2]. Septa of two orders: 1) Major septa long, the cardinal septum reduced, replaced by fossula. The longest is the counter septum. Discontinuity of major septa within the stereozone. 2) Minor septa short, not extending beyond the horizontal dissepiments. Tabulae occasionally incomplete, concave or flat. Structure of septa trabecular. Trabecular granules with a fan-like arrangement. Strongly developed stereome on septa, dissepiments and tabulae. Horse-shoe dissepiments not detectable.

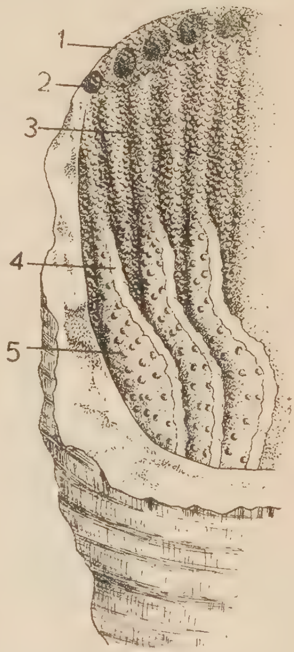

Fig. 2. — *Protomacgeea dobruchnensis* n. sp., holotype. Grzegorzowice beds No. 2. Distal end of calyx, inside view (somewhat schematic); *1* epitheca, *2* zone of flat dissepiments, *3* zone of flattened septal ridges, *4* zone of lamellar septa, *5* trabecular granules; × 8.5.

Macroscopic description (fig. 2-4). — Conical corallites slightly bent or straight, with periodical narrowings, covered over their entire length, even beyond the calicular margin, by a consolidated transversely striated epitheca. Between the epitheca and the stereozone is a row of openings with the peripheral ends of

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[2] According to D. Hill (1935), *stereozone* is a zone of structural elements strongly dilated by a layer of stereome. In genus *Protomacgeea* the ring of horse-shoe dissepiments is involved in the stereozone.

septa passing in between. Majority of specimens is from 4 to 5 mm in diameter. The largest specimen from Wydryszów is 21 mm in length and 12 mm in diameter. The proximal end carries a needle-like pedicel. The calyx is with a sharp margin, vertically descending inward; it is very deep (fig. 3), bell-shaped. The distal ends of septa, close to the calicular margin (fig. 2), are flat, wide, covered with conspicuous, subcircular trabecular granules, arranged in horizontal rows. Near the floor of the calyx the septa grow lamellar and are pinnately arranged in relation to the reduced cardinal septum, thus forming the fossula. Lateral trabecular granules are seen, arranged fan-like in relation to the zone where the horse-shoe dissepiments would be expected, had not their development been checked by so thick a deposit of stereome as to cause discontinuity of major septa.

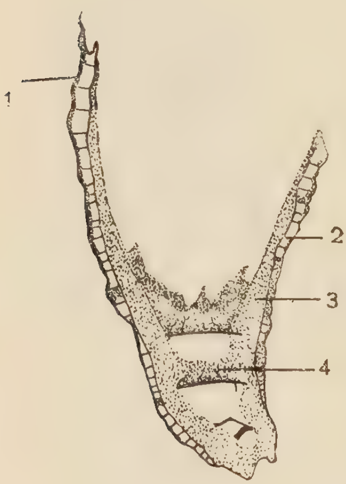

Fig. 3. — *Protomacgeea dobruchnensis* n. sp., holotype. Grzegorzowice beds No. 3. Longitudinal section of corallite; *1* epitheca, *2* zone of flat dissepiments, *3* stereozone, *4* tabula with layer of stereome; × 6

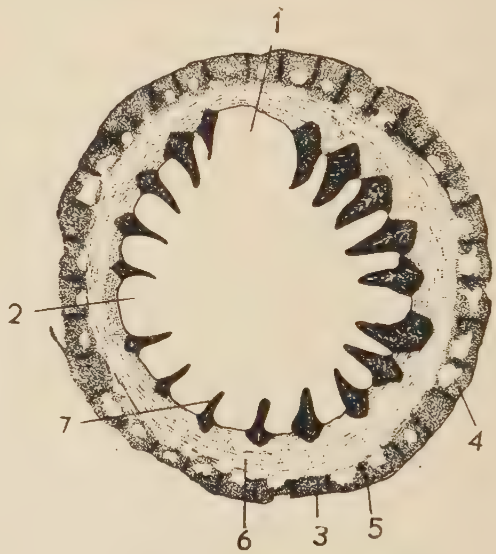

Fig. 4. — *Protomacgeea dobruchnensis* n. sp., holotype. Grzegorzowice beds No. 3. Transverse section, ephebic stage; *1* fossula in place of the aborted cardinal septum, *2* ditto below the alar septum, *3* epitheca, *4* flat dissepiments, *5* peripheral edges of major and minor septa, *6* stereozone, *7* axial edges of major septa; × 12.

Transverse section (fig. 4) shows three concentrically arranged zones: 1) The outer zone, including the epitheca and the peripheral edges of septa with intervening openings corresponding to horizontal dissepiments. Zone 1 is delimited by a dark circle counterfeiting an inner wall. Accord-

ing to a communication by letter from the recently deceased Dr. S. Smith there is no aulos [3] here. The circle seems to have been given rise to by the process of fossilisation which is responsible, as has more than once been observed by the writer, for the formation of a distinct boundary line delimiting two different zones. 2) The median zone is the stereozone, occurring here as light stereome without signs of septal trabecular lines. 3) In the centre of calyx is a ring of axial parts of major septa. With a diameter of 5 mm there are 18 septa. The cardinal septum is reduced, being replaced by a distinct fossula. Two similar but smaller fossulae occur below the alar septa. The counter septum is generally longer than the adjacent metasepta. Their length is made even in the distal end of the calyx.

Longitudinal section (fig. 3) shows the following morphological features: 1) Epitheca with several transverse narrowings, projecting over the pseudotheca. 2) A vertical row of horizontal dissepiments between the epitheca and the stereozone. The epitheca also surrounds the entire pedicel (fig. 8). In the pedicel are visible two thin complete tabulae, whereas the true corallite starts to develop above the third tabula and has its proximal part occupied entirely by the sclerenchyme [4]. The calyx is 2.5 mm deep, the whole length of the corallite being 5 mm. In very young corals the tabulae do not develop owing to the whole interior being occupied by the sclerenchyme. The tabulae here are concave or flat, complete or incomplete.

Microstructure (fig. 5) throws some light on the peculiarly characteristic morphology of the corallite. The epitheca is, as usual, squeezed in between the peripheral edges of septa, no structure being detectable. The peripheral edges of septa are trabecular, displaying several centres of calcification and the nearly parallel fibres issuing from the centres and elongated by the rim of the stereome. The stereozone ring, which has been deposited on the inconspicuous horse-shoe dissepiments, is contiguous with the zone of flat axial dissepiments. The septa play no part in building up the stereozone, neither is any trabecular line detectable, its structure being characteristically concentric. Axial edges of septa, with distinct trabecular lines as the prolongation of the interrupted peripheral edges of septa, appear in the median part of stereozone. Their centres of calcification are with long fibres seemingly elongated owing to the lateral contiguity of the stereome. In the longitudinal section (fig 8) trabeculae are not clearly distinguishable, being masked by the stereome. However, occasional striae in the sclerenchyme suggest pre-

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[3] S. Smith (1945, p. 4) defines *aulos* as „a tubular wall within the tabularium, formed by the union of the deflected axial edges of the major septa".

[4] *Sclerenchyme* is „the calcareous tissue of corals" (S. Smith 1945, p. 8).

sence of trabecular fans, since the trabeculae sometimes show an arrangement from top outside, to the base inward. In tetracorals the predominant direction in the arrangement of trabeculae is oblique from the base outside upward and inward.

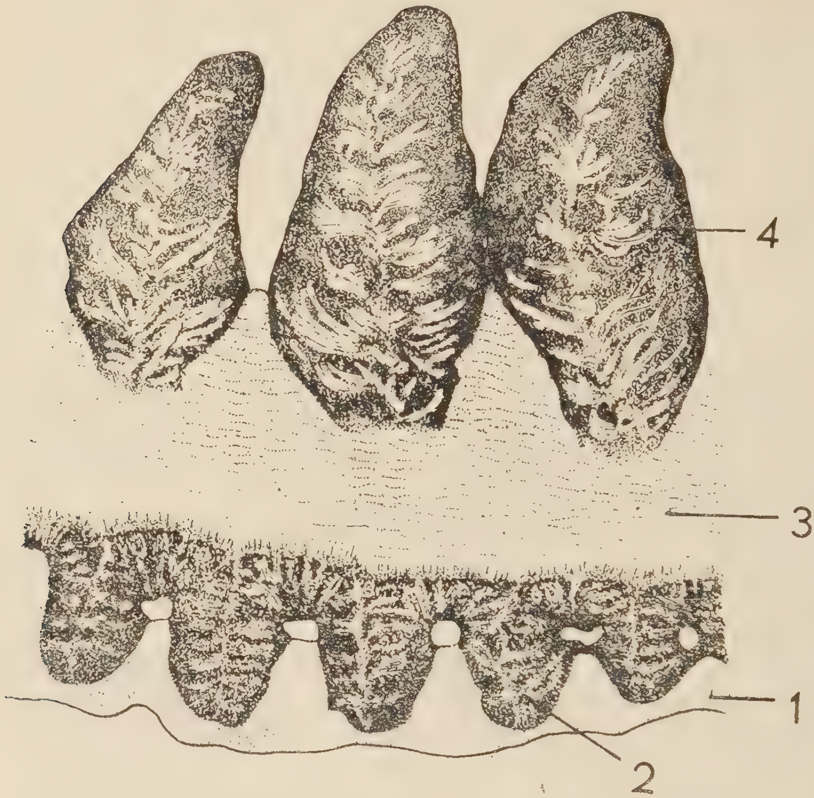

Fig. 5. — *Protomacgeea dobruchnensis* n. sp. Grzegorzowice beds No. 3. Microstructure of part of calyx in transverse section; *1* epitheca, *2* peripheral edges of septa with trabecular line, *3* stereozone made up of concentrically disposed stereome flakes, *4* trabecular lines of axial parts of septa; × 66.

Ontogeny (fig. 6*A*-*C*, 8). — The Grzegorzowice specimens yielded by hard bituminous limestones are occasionally so beautifully preserved as to give most interesting issues resulting from observation of their ontogeny. In the 1st (nepionic) stage (fig. 6*A*, 8), the larva, upon attachment, produced a pedicel with a diameter of 0.7 mm and 2 mm in length. The pedicel is covered by the epitheca, there are 8 septa which are disposed as short ridges with bilateral symmetry, their peripheral edges are inserted in the epitheca. Two complete tabulae are distinguishable in the longitudinal section. The 2nd stage (early neanic) is shown in fig. 6*B*). The transverse section of a young individual, 1.3 mm in diameter, clearly

indicates the development of but one septum, the counter septum. The remaining part of the corallite is occupied by sclerenchyme. Stage 3 (fig. 6C) shows the long counter septum and on each of its sides from 3 to 4 shorter septa. The quadrants, near the yet undeveloped cardinal septum, are occupied by structureless sclerenchyme. The zone of horizontal dissepiments is still lacking, too. Stage 4 (fig. 7), 6 mm in diameter, is with 22 major septa inside the calyx and 22 minor septa within the epitheca and the horizontal dissepiments so that the total number of septa in the calyx is 44. The cardinal septum is markedly short, below it is a fossula which has been formed owing to the pinnate arrangement of adjacent septa. The counter septum continues to be very long. The final stage is figured in fig. 4 showing the transverse section of calyx. The

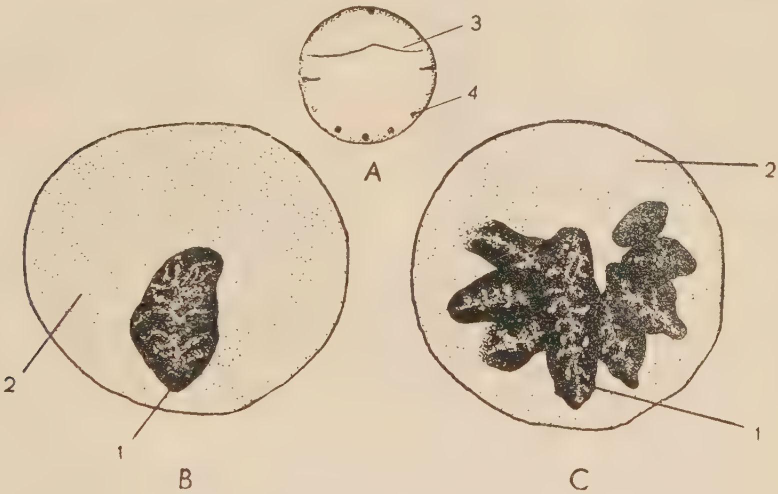

Fig. 6. — *Protomacgeea dobruchnensis* n. sp. Grzegorzowice beds No. 3. *A* transverse section of pedicel in the first (nepionic) stage, × 10; *B* transverse section in second (neanic) stage, × 40; *C* transverse section in the third (neanic) stage, × 23; *1* counter septum, *2* stereome, *3* tabula, *4* septum set in epitheca.

cardinal septum is almost entirely reduced, only the trabecular line of its peripheral edge being distinguishable. The counter septum has attained the level of the adjacent septa. The stereozone between the peripheral and axial septal zone is clearly indicated.

The general conclusions to be drawn from a study of the above ontogeny may be summed up as follows: 1) The corallite is provided with a pedicel which is rather an exceptional character in tetracorals. The wall consists of the epitheca only, the tabulae are complete, the septa of trabecular structure, with a bilateral symmetry arrangement. 2) The structure of the corallite begins to develop above the pedicel. It is mar-

kedly characteristic of that genus by the interior of the corallite being wholly occupied by sclerenchyme, showing a striking bilateral symmetry since the counter septum only is developed. 3) The stereome is first reduced on the side of the counter septum and it is there that the next septa appear. 4) The bilateral symmetry persists all through the

Fig. 7. — *Protomacgeea dobruchnensis* n. sp. Grzegorzowice beds No. 3. Transverse section in the fourth (neanic) stage; *1* cardinal septum, *2* counter septum; × 7.5.

ontogeny owing to the presence of the long counter septum and the reduction of the cardinal septum. The stereome about the cardinal septum is reduced last, while on the horse-shoe dissepiments it persists through all ontogenic stages.

Individual variability is very strong in this form. Straight forms occur along with bent, even forms together with narrowed, stout with slender ones. The largest specimens have been collected from marls where they attain 21 mm in height. Variability of internal structure is displayed by different rate of reduction of stereome which may either occupy the whole inside of the corallite, or be reduced already in its early ontogenic stages. The tabulae are complete or incomplete, concave or horizontal. The septal structure does not change, the horse-shoe dissepiments do not develop. Mutual relation of the septa to the calicular diameter is not clearly determinable owing to the septa, thickened by stereome, being so completely contiguous, that it is not possible to count them.

Affinities and differences. — Morphologic structure and ontogeny are here of very peculiar type, not encountered in any other representatives of the Pachyphyllinae. The assignment of this species to the Pachyphyllinae has been confirmed by S. Smith, recently deceased, an outstanding authority in problems pertaining to tetracorals. A specimen of this form

being sent to him by the present writer, requesting his opinion, S. Smith asserted that it comes nearest to *Thamnophyllum stachei* Penecke. The topotype of *Th. stachei* Penecke has been kindly supplied to the writer by Dr. H. Flügel of Graz, for which she here wishes to convey her best thanks. A comparison between the Polish and Austrian specimens disclosed difference in structure and generic position.

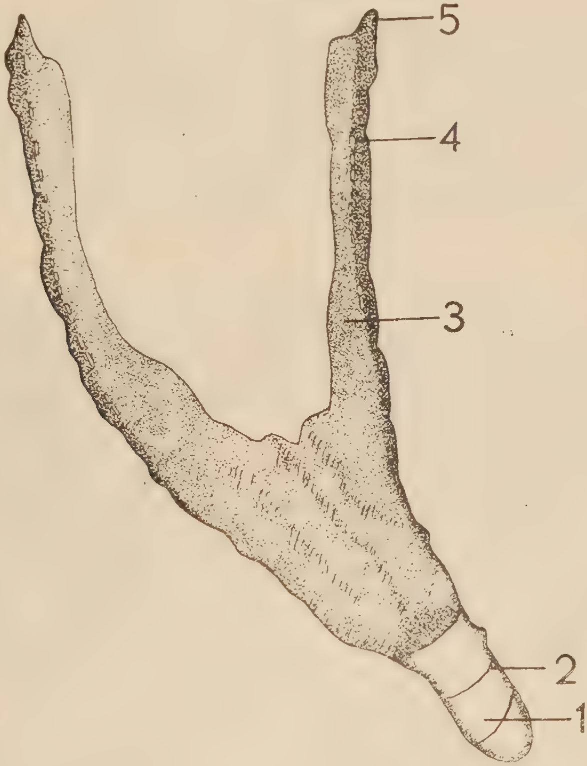

Fig.8. — *Protomacgeea dobruchnensis* n. sp. Grzegorzowice beds No. 3. Longitudinal section of an immature individual with pedicel; 1 pedicillum, *2* tabula, *3* stereozone, *4* flat dissepiment, *5* epitheca; × 8.

Occurrence. — All the studied specimens have been yielded by Middle Couvinian beds where they are associated with *Rhopalophyllum heterophyllum* E. & H. and *Pseudozonophyllum excentricum* Różk. in Grzegorzowice and Wydryszów. In Poland it is the oldest representative of Pachyphyllinae.

Genus *Macgeea* Webster, 1889

Macgeea bathycalyx bathycalyx (Frech)

(fig. 9, 10)

1886. *Cyathophyllum bathycalyx* Frech; F. Frech, Die Cyathophylliden..., p. 67, text and drawing.

1949. *Cyathophyllum bathycalyx* Frech; A. v. Schouppé, Die „Thamnophyllen"..., p. 175.

F. Frech (1886) has described *Cyathophyllum bathycalyx* from the Middle Devonian of the Eifel Mts. (crinoidal-, *Calceola*-, and *Stringocephalus*-beds). His drawings figured on plates 5 & 7, however, show that individuals belonging to other genera (Frech's pl. 5 fig. 17-23 and pl. 7 fig. 8-11) have by F. Frech been referred to this species in addition to representatives of genus *Macgeea* (Frech's text-figure on p. 67).

Fig. 9. — *Macgeea bathycalyx bathycalyx* (Frech). Skały beds No. 8. Longitudinal section resembling F. Frech's drawing on p. 67 (1886); × 5.

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Fig. 10. — *Macgeea bathycalyx bathycalyx* (Frech); same specimen as fig. 9. Transverse section in neanic stage; *1* cardinal septum; × 7.5.

Specimens of *M. bathycalyx* (Frech), as clearly shown by the text-figure on p. 67 (F. Frech, 1886), are with the following diagnostic characters: corallite in the shape of a slightly bent cone; longitudinal section with a wide row of horizontal dissepiments; closely spaced horse-shoe dissepiments with inflated walls, a zone of ordinary obliquely set dissepiments; vesiculate periaxial tabulae; axial tabulae somewhat convex, occasionally with supplementary plates. This description leads us to infer that *Cyathophyllum bathycalyx* Frech is a representative of genus *Macgeea*, as has already been correctly asserted by A. Schouppé (1949).

F. Frech's original material was not, regretfully, accessible to the writer. Nevertheless, the allied forms recorded from the Givetian deposits of Skały are by her regarded as subspecies and mutations of this species. One specimen among them, of which two sections have been cut, comes nearest the typical *Cyathophyllum bathycalyx* Frech. It is with a conical shape and similar internal structure.

There are 23 major septa in the *transverse section* of the proximal part of the corallite (fig. 10), with a diameter of 6 mm. The cardinal septum is shorter. The adjacent septa have a nearly parallel arrangement. The counter septum is somewhat longer than the septa in the neighbouring quadrants. Major septa are long, almost reaching the axis of the calyx. Their axial edges are rhopaloid. The minor septa are short, extending somewhat beyond the zone of the small thick-walled horse-shoe dissepiments.

The *longitudinal section* (fig. 9) cut of a badly damaged corallite, 12 mm in length, shows in the proximal end dilated septa, longitudinally intersected. The flat dissepiments are wide. The horse-shoe dissepiments are with thickened wall and, as in F. Frech's drawing, arranged in flexuous lines. Ordinary dissepiments occur along with gently convex, incomplete tabulae.

On evidence of Polish material, the above species displays extreme variability, though it also has constant features, characteristic of all the varieties. They are: 1) shortened cardinal septum with a fossula near it, 2) counter septum longer than the adjacent septa reduced to same length in calicular pit, 3) tabulae incomplete, more or less convex, occasionally with supplementary plates.

On the above mentioned characters the writer has established, besides the type form, the following 4 subspecies and 1 mutation:

Macgeea bathycalyx kasimiri
M. bathycalyx josephi, very widespread and with the greatest vertical range
M. bathycalyx regularis
M. bathycalyx longiseptata
M. bathycalyx amabilis, the youngest representative of this group.

Macgeea bathycalyx kasimiri n. subsp.

(fig. 11-15; table 1)

Holotype: fig. 12, 13.

Material. — 33 specimens collected from mudstones intercalated in limestones of strata 6 and from argillaceous marly shales in beds No. 8. Five transverse and longitudinal thin sections were prepared.

Diagnosis. — Corallites low, shaped like a suddenly dilating, bent cone, rarely provided with a talon, surface with concentric striation of

epitheca which terminates about 3 mm below the calicular margin. The corallites average about 10 mm in diameter and have about 29 major septa. Calyx deep, steep, attaining sometimes three fourths of the length of the corallite. Septa carinate, the major septa extending to the axis of calyx, while the cardinal septum is somewhat shorter, the counter septum being slightly longer than the adjacent septa. Broad flat dissepiments, slight thick-walled horse-shoe dissepiments. Tabulae incomplete, vesicular, with a thick stereome cover. The proximal end entirely occupied by sclerenchyme. Bilateral symmetry followed through all the ontogenetic stages.

Macroscopic description (fig. 11). — Corallite horn shaped, with suddenly increasing diameter. The proximal end is pointed, talon generally wanting. The entire surface closely covered by epitheca, either smooth

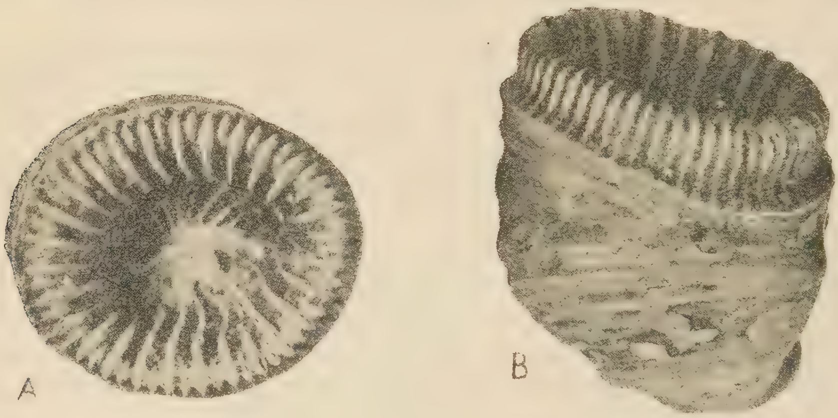

Fig. 11. — *Macgeea bathycalyx kasimiri* n. subsp., paratype. Skały beds No. 6; *A* inside of calyx, × 4; *B* side view of corallite; × 3.3.

or transversely striated, as is common in genus *Macgeea,* the epitheca does not extend to the very margin of the calyx, but terminates 3 mm below it. This leaves the septa uncovered, with an arched distal edge carrying carinae. The sides of the septa are ornamented by granules in a most regular fan-like arrangement. The calyx is very deep and generally attains from one third to one half the height of the corallite; in very young individuals it is three fourths of the general length, in one very young individual, 4 mm high and 4 mm in diameter, the calicular depth is 3 mm. The sides of the calyx descend vertically, the floor is gently convex with the counter septum visible on it, the latter being very long and extending beyond the axis of the calice. Major septa nearly reach the axis while the cardinal septum is short and does not reach the floor of the calyx.

Transverse section (fig. 12), cut above the tabularium, shows the epitheca into which are welded the somewhat dilated peripheral edges of septa. The zone corresponding to the cone of flat dissepiments is broad, the septa are here narrowed while they swell out again within the ring of horse-shoe dissepiments. The walls of the horse-shoe dissepiments are dilated, their lumen is small. The major and minor septa differ in their length only, since minor septa are but slightly external to the pseudotheca (fig. 12). The number of septa is dependent on the size of diameter, as is shown in table 1.

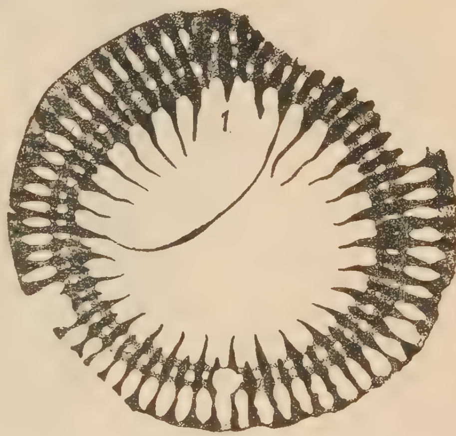

Fig. 12. — *Macgeea bathycalyx kasimiri* n. subsp., holotype. Skały beds No. 6. Transverse section of calyx; *1* cardinal septum; × 4.7.

Table 1

Correlation between the number of septa and the diameter of calyx in *Macgeea bathycalyx kasimiri* n. subsp.

Diameter of calyx (*in mm*) / Number of septa	3;4	5;6	7;8	9;10	11;12	13;14	15;16	17;18	Number of specimens ↓
14 ; 15	1								1
16 ; 17		1							1
18 ; 19		1							1
20 ; 21		1							1
22 ; 23									
24 ; 25			3						3
26 ; 27			1	4					5
28 ; 29				2	4	1			7
30 ; 31				1	1				2
32 ; 33						1			1
Total :	1	3	4	7	5	2			22

Longitudinal section (fig. 13, 14). The interior is characterized by a thick deposit of the stereome found on the epitheca, the horse-shoe dissepiments and on the tabulae most particularly so. The proximal end is

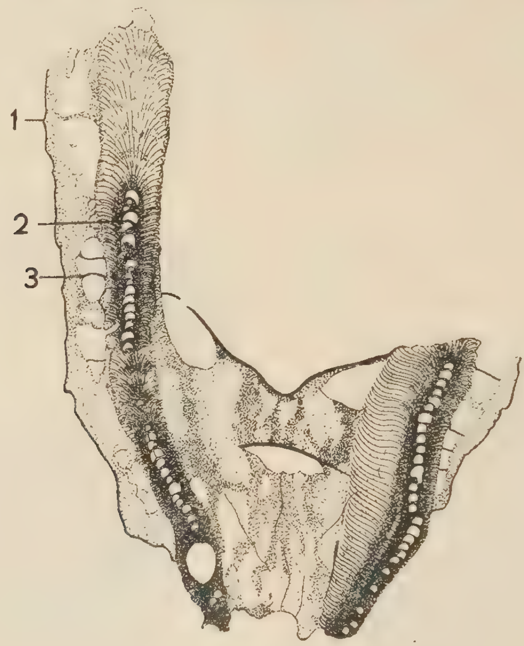

Fig. 13. — *Macgeea bathycalyx kasimiri* n. subsp., holotype. Skały beds No. 6. Longitudinal section of immature individual;
1 epitheca, *2* horse-shoe dissepiments with trabecular fan, *3* flat dissepiment; × 5.3.

entirely occupied by sclerenchyme, through which the horse-shoe dissepiments are seen as small globose foramina. In this part the tabulae are missing, they occur somewhat higher up (fig. 14), consisting of globose periaxial elements and gently convex or flat axial elements. All these parts are strongly thickened by stereome.

Microstructure. — Trabecular fans and stereome are the predominant skeletal elements of these corallites. As may be observed in the longitudinal thin section (fig. 13, 14), the fans are broad and flat. In the periaxial end trabeculae are almost horizontally arranged. Growth striation is clearly indicated (fig. 13), new trabeculae appear by insertion in the trabeculae of the already existing fan, always above the new horse-shoe dissepiment. In the peripheries trabeculae branch dichotomously. They are made up of sclerodermite bundles corresponding to the trabecular granules on the lateral septal surface. On the tabulae, in the proximal

part more particularly so, the stereome mass consists of calcareous flakes disposed in irregular bands which, when contiguous to fans, form their continuation. In transverse section septa are seen to be built of closely spaced calcification centres with long fibres, particularly in the dilated part of the septum.

Fig. 14. — *Macgeea bathycalyx kasimiri* n. subsp. Skały beds. No. 6. Longitudinal section of more mature individual; × 5,3.

Ontogeny (fig. 15) has its course line uniform in all the varieties of this species from the Givetian deposits of Skały. Bilateral symmetry predominates from the initial stages; the counter septum is very long and extends beyond the central point of the corallite, while the cardinal septum is shortened and the septa adjacent to it have an almost parallel course. Sclerenchyme occupies all the interior of the proximal end, being first reduced in the axial or peripheral part of the corallite, while the stereome persists longest on the side of the cardinal septa, even through the ephebic stage. In some corallites the stereome is reduced in the proximal part almost from the very beginning, persisting on the side of the cardinal septum only. The talon is to be seen near the proximal end in very few specimens only; it is situated on the side of the cardinal septum, i. e. on the convex side of the corallite. When the epitheca has been worn or washed off in HCl, the cardinal septum is clearly indicated on the surface of the corallite, surrounded by adjacent, pinnately arranged septa, as shown in fig. 15. Bilateral symmetry of the calyx is followed

through the whole ontogeny of the corallite. As late as in the ephebic stage the cardinal septum is distinguished by being shorter than the neighbouring metasepta and set in the fossula formed owing to the inclination of the metasepta.

Fig. 15. — *Macgeea bathycalyx kasimiri* n. subsp. Skały beds No. 6. Transverse section in neanic stage; *1* cardinal septum, *2* counter septum: × 5.

Individual variability is displayed in the shape of the cone which may either be that of a short stout horn, or be slender. The surface may be with numerous transverse constrictions. In the interior of the corallite the tabulae may be almost horizontal or have the appearance of being broken up into vesicles. The thickness of stereome cover varies.

Affinities and differences. — The above variety presents a shape resembling that of the specimen shown by F. Frech (1886) in a longitudinal section on page 67. The disposition of the tabulae is similar, but in our specimens the stereome is more abundant.

Occurrence. — The here considered subspecies is characteristic of mudstones resting directly on *Calceola* limestone of Skały and less often in marly argillaceous shales.

Macgeea bathycalyx josephi n. subsp.

(fig. 16-18; table 2)

Holotype: fig. 16, 17.

Material. — This is a subspecies more common than the above described forms and with a greater vertical range. From the mudstones and marls (beds Nos. 5, 6, 8, 10, 12) the writer has collected 71 specimens. 26 longitudinal and transverse thin sections were prepared, some also through the proximal end.

Diagnosis. — The corallite is shaped like a bent, elongated cone, sometimes carrying a talon. Distinct bilateral symmetry is followed throughout the ontogeny. The cardinal septum is shorter. Carinae and granules conspicuous. Tabulae incomplete. Periaxial parts vesiculate, the axial convex, frequently with supplementary plates. The corallites average about 9 mm in diameter and have about 29 major septa.

Macroscopic description (fig. 17). — Virtually all the corallites are in a damaged condition. The epitheca covers nearly the whole of the specimen terminating somewhat below the calicular margin. In some specimens, with proximal end not damaged, a talon is occasionally distinguishable. The septa have the edges carinate and the sides with granules. The depth of the calyx is not known. The number of septa is dependent on the size of the calyx, as is specified in table 2.

Table 2

Correlation between the number of septa and the diameter of calyx in *Macgeea bathycalyx josephi* n. subsp.

Diameter of calyx (in mm) / Number of septa	3;4	5;6	7;8	9;10	11;12	13;14	15;16	17;18	Number of specimens ↓
14 ; 15	1								1
16 ; 17									
18 ; 19									
20 ; 21									
22 ; 23		5	1						6
24 ; 25		3	5	2					10
26 ; 27			10	2					12
28 ; 29			4	11	2				17
30 ; 31				8	2	1			11
32 ; 33				7	3	1			11
34 ; 35					1	1			2
36 ; 37					1	2			3
Total :	1	8	20	30	9	5			73

Transverse section (fig. 16). Septa are of two different lengths. in the ephebic stage they do not reach the axis. Practically all the transverse sections show that the cardinal septum is shorter than the adjacent septa, while those belonging to the quadrants about the counter septum, lean against the tabulae and terminate at a nearly level line. The septa have distinct carinae, which are more strongly developed in the ring of the horse-shoe dissepiments. The shorter septa extend beyond the pseudotheca. The lumen of the horse- shoe dissepiments is large since their walls are but slightly dilated.

Longitudinal section (fig. 17). Dissepiments broad, fine and flat (1.5 to 2 mm), recognisable only in cases when the epitheca has been preserved The horse-shoe dissepiments are closely spaced, with walls slightly dilat-

ed; near the horse-shoe dissepiments, normal dissepiments occur with walls somewhat thickened, also vesiculate periaxial tabulae sometimes hardly distinguishable from dissepiments. In the axial part the tabulae

Fig. 16. — *Macgeea bathycalyx josephi* n. subsp., holotype. Skały beds No. 8. Transverse section in ephebic stage; *1* cardinal septum; × 5.

Fig. 17. — *Macgeea bathycalyx josephi* n. subsp., holotype (same specimen as fig. 16). Longitudinal section of corallite; × 5.

are flat or convex and occur in bundles, some of them have a thin cover of stereome, more particularly so in the proximal area.

Ontogeny (fig. 18). — The proximal part is damaged in most cases, but sections with diameter of 3 mm show that in some corallites the stereome is completely reduced; when so, there is a long counter septum and a short cardinal septum. In other sections, however, septa thickened by stereome are laterally contiguous over their entire length, hardly without any free intervening spaces, even when 5 mm in diameter. The disproportion between the cardinal and the counter septum is always distinct.

Individual variability is very marked. It is displayed in the outer shape of the corallites, ranging from forms which are short, broad, conical and bent to straight elongated ones. The internal structure is also subject to great variations. The tabulae may be concave, incomplete, flat or convex.

disposed in bundles. In some corallites the tabulae are broad, flat or convex, occasionally complete. Septa usually very closely follow the bilateral symmetry arrangement. In the ephebic stage of some corallites the cardinal septum is almost flush with adjacent septa, as is also the counter septum. In some specimens the carinae are closely spaced and conspicuous, in others they are not readily recognizable.

Affinities and differences. — The longitudinal section of some specimens resembles F. Frech's drawing (1886), but the tabulae of the Skały specimens are usually more convex and more frequently occur arranged in bundles. D. Sobolew (1904) described *Cyathophyllum bathycalyx* from beds No. 8 and 9 of Skały *(Calceola* and crinoidal limestones). It was a specimen referable to the here described subspecies. D. Sobolew has also recorded *C. bathycalyx* Frech var. *skalense* Sobolew from the *Cultrijugatus* beds in exposure No. 2 of Grzegorzowice. Although the writer has had at her disposal ample material from the Couvinian beds of Grzegorzowice and in spite of having, with great care, polished the corallites, she did not discover any representative of species *Macgeea bathycalyx*. Forms more common there were those of the converging species *Ceratophyllum typus* Gürich. Fragments of small slender corallites often resemble *Thamnophyllum trigemme*, but *M. bathycalyx josephi* shows normal dissepiments with somewhat dilated walls and attaining the minor septa (according to D. Hill, 1935), while the tabulae are disposed in bundles and the septa are laterally carinate. *Macgeea bathycalyx josephi* differs from subspecies *Macgeea bathycalyx kasimiri* in being shaped like a slightly elongate cone and in the strong reduction of stereome on the tabulae.

Fig. 18. — *Macgeea bathycalyx josephi* n subsp. Skały beds No. 8. Transverse section in neanic stage. septa strongly dilated by sclerenchyme: *1* cardinal septum. *2* counter septum; × 12.

Occurrence. — The above subspecies is recorded from Skały in beds containing *Nardophyllum tenue* Wdkd., *Lithophyllum corneolum* Wdkd.. *Mesophyllum defectum* Schlüter, *Sparganophyllum* sp., *Heliophyllum halli*, *Pseudocosmophyllum geigeri* Wdkd. After R. Wedekind's stratigraphic scale (1925) these are all forms referable to the Middle Givetian.

Macgeea bathycalyx regularis n. subsp.
(fig. 19, 20)

Holotype: fig. 19, 20.

Material. — 2 specimens from marly limestones with its transverse and longitudinal sections (beds No. 8).

Diagnosis. — The corallite displays a most regular structure, the calyx is circular in section, when the diameter is 13 mm, there are 33 straight major septa, spindle like within the pseudotheca. Extremely numerous carinae. Horse-shoe dissepiments and normal dissepiments thickly coated by stereome. Tabulae incomplete, their axial parts convex and disposed in bundles.

Description of sections (fig. 19, 20). — Diagnostic characters of this subspecies are those of the typical *M. bathycalyx*, with, moreover, additional peculiar details of morphology, which allow its assignment to a separate variety occurring in limestones.

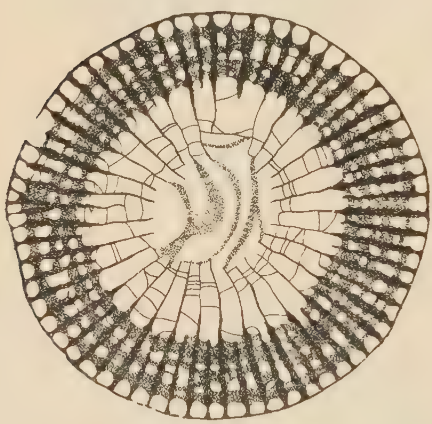

Fig. 19. — *Macgeea bathycalyx regularis* n. subsp., holotype. Skały beds No. 5. Transverse section in ephebic stage; × 4.

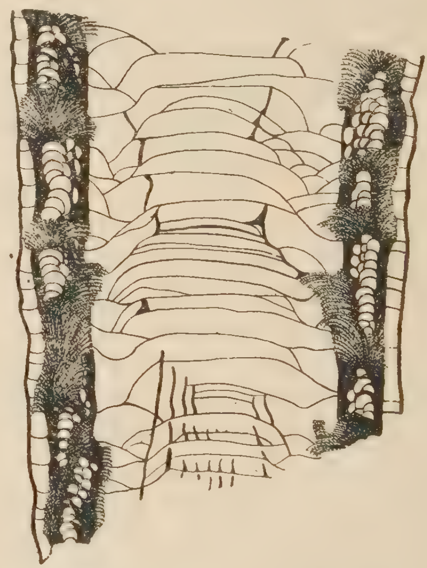

Fig. 20. — *Macgeea bathycalyx regularis* n. subsp., holotype (same specimen as fig. 19). Longitudinal section; × 4.3.

The calyx is circular in section, with a diameter of 13 mm. It is involved by almost completely preserved epitheca. The peripheral part of septa is thin within the zone corresponding to the flat dissepiments. Within horse-shoe dissepiments and normal dissepiments the septa are spindle-like and provided with numerous carinae. There is abundant stereome on the walls of the horse-shoe and normal dissepiments. The

axial edges of septa are short and thin. The centre of calyx is free from septa, the sections of tabulae only being recognizable. The minor septa are long and pass through the rings of horse-shoe dissepiments and the thick-walled dissepiments. Longitudinal section (fig. 20) shows the structure to resemble closely that of *M. bathycalyx josephi*. The flat dissepiments are widely spaced. The lateral walls of horse-shoe dissepiments and the walls of normal dissepiments internally contiguous with the horse-shoe dissepiments are strongly dilated. The tabulae consist of a broad periaxial part built up of large vesicles and of an axial part made up of bundles of convex tabulae.

Affinities and differences. — The above subspecies comes nearest to *M. bathycalyx josephi* in the number of its septa with correlated calicular diameter and in a markedly similar arrangement of tabulae. The differences lie in the very regular course of septa and the thick cover of stereome on the horse-shoe dissepiments as well as on normal dissepiments.

Macgeea bathycalyx longiseptata n. subsp.
(fig. 21, 22)

Holotype: fig. 21, 22.

Material. — One damaged specimen, collected from a dump-heap next to an exposure of *Calceola* limestone, of which the transverse and longitudinal sections have been prepared.

Diagnosis. — The corallite is sub-cylindrical, circular in transverse section, with 32 major septa when the diameter is 12 mm. Major septa long, minor septa half the length of the major. The cardinal septum slightly shortened. Septa carinate. Tabulae vesiculate, showing a bundle-like arrangement in the axial part.

Description of sections (fig. 21). — There are 64 septa in a calyx with diameter of 12 mm. Over half their length the septa are dilated in a spindle-like shape, the axial edges being likewise, in some parts, dilated and leave but a very small free central area, 2 mm in diameter. The somewhat shortened cardinal septum is in the fossula. Minor septa are somewhat narrower and extend beyond the pseudotheca, occasionally attaining nearly half the length of the major septa. Lateral carinae are readily recognizable, particularly so in the zone of the horse-shoe dissepiment ring. Walls of horse-shoe dissepiments sometimes so thick as to close up nearly the whole of their lumen.

Longitudinal section (fig. 22). The structure, as seen in longitudinal section, is strikingly characteristic. A very wide zone of flat dissepiments (2 mm) is seen in the periphery. The horse-shoe dissepiments sometimes occur arranged in two adjacent rows, with lateral walls markedly di-

lated. The stereome also coats the walls of the vertically placed normal dissepiments. Tabulae are incomplete and somewhat different from those in other *Macgeea* varieties thus far described. Their large vesiculate periaxial parts are recognizable in the upper end of the corallite, while in the centre there are bundles of slightly convex axial tabulae. In the proximal end of the corallite the structure of tabulae is irregularly vesiculate, a thick coating of stereome showing on their surface. Since the thin section does not cut through the axial part of the corallite, the short elongate sections of septa are shown in the tabulae.

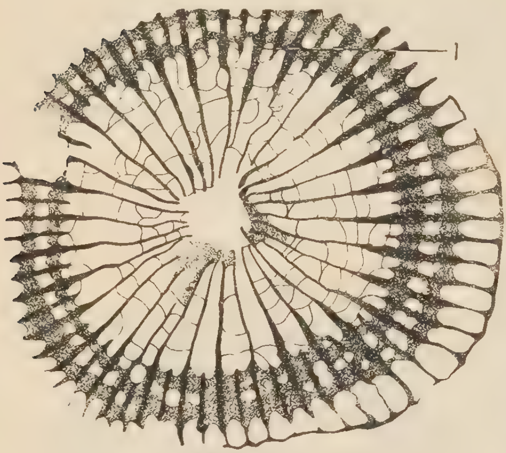

Fig. 21. — *Macgeea bathycalyx longiseptata* n. subsp., holotype. Skały beds No. 5. Transverse section in ephebic stage; *1* cardinal septum; × 4.7.

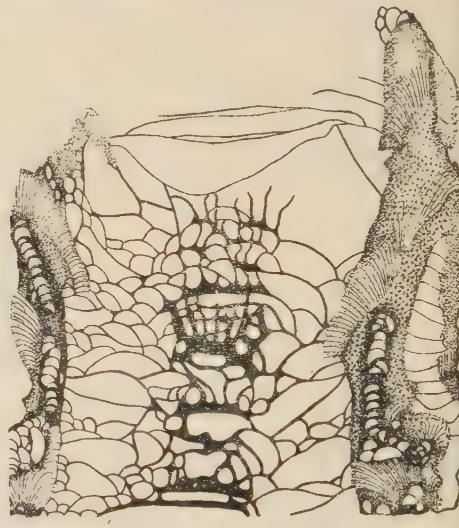

Fig. 22. — *Macgeea bathycalyx longiseptata* n. subsp., holotype. Longitudinal section of specimen of fig. 21; ×4.

Microstructure (fig. 22). — There is a thick layer of concentrically striated stereome on walls of the horse-shoe dissepiments, greatly diminishing the lumen in the horse-shoe dissepiments. The stereome dilation also involves the walls of the widely spaced normal dissepiments. Trabeculae are crowded, the carinae of yard-arm type [5]. The longitudinal section shows a most characteristic representation of strongly differentiated fans of the type observed by the writer in Frasnian *Macgeea* species only, i.e. fans high, trabeculae clearly separated, bifurcating at the margin of fans. Sclerodermites are complex and distant. Occasionally, however, within the zone of horse-shoe dissepiments, instead of separated

[5] „*Carinae:* flanges on the sides of a septum. *Yard-arm carinae* when they are opposed and appear in transverse section as short bars crossing the septum at right angles" (partim S. Smith, 1945).

trabeculae, granules are seen arranged in their direction and corresponding to sclerodermite fascicles.

Affinities and differences. — The writer has made the here described specimen a subspecies of species *Macgeea bathycalyx* on the arrangement of septa and the disposition of tabulae which are essentially similar in that respect to *M. bathycalyx josephi*. The differences lie in the longer septa of *M. bathycalyx longiseptata*, in the disposition of the axial parts of tabulae and in the extremely peculiar structure of trabecular fans. From the "Middle Devonian, Eifel" (W. D. Lang & S. Smith, 1935) species *Disphyllum* (or *Macgeea*) *dubium* (de Blainville), our specimen differs in the presence of longer minor septa, in the fossula into which the cardinal septum has been inserted, and in the disposition of tabulae displaying axially a parallel arrangement, in spite of their vesiculate structure.

Macgeea bathycalyx amabilis n. mut.

(fig. 23-25; table 3)

Holotype: fig. 23-25.

Material. — 56 specimens from lens of strongly arenaceous marly shales occurring in a bryozoan bank (beds No. 11); 11 transverse and longitudinal thin sections with stages of early ontogeny. The specimens are in a fairly satisfactory condition of preservation, except that the calices are mostly damaged and compressed.

Diagnosis. — Corallites elongate, slightly bent, less often broadly conical, commonly provided with a talon. The epitheca terminates 2 mm below the margin of corallite. Septa carinate. Calyx deep. Conspicuous bilateral symmetry, particularly so in early ontogeny. Tabulae convex, incomplete, arranged in bundles. The corallites average about 8 mm in diameter and have about 27 major septa.

Macroscopic description. — The corallites are satisfactorily preserved, with proximal end not damaged, usually carrying a talon. The surface is entirely covered by a thick epitheca with fine transverse striation through which the septa are not seen, strong transverse narrowings occur frequently. The surface is exposed over an area 2 mm wide, below the calicular margin. Here the septal edges are distinctly carinate, while trabecular granules occur laterally, in a fan-like arrangement. The margin of the calyx is rounded and sometimes narrowed in comparison with the lower part of the corallite; whereas in some specimens the calyx widens out upward. Corallites of this mutation are larger than those in the previously described subspecies, out of 56 specimens, 13 are with height exceeding 20 mm, while septa are proportionate to the calicular diameter, as specified in table 3.

Table 3

Correlation between the number of septa and the diameter of calyx in *Macgeea bathycalyx amabilis* n. mut.

Diameter of calyx (in mm) / Number of septa	3;4	5;6	7;8	9;10	11;12	13;14	15;16	17;18	19;20	Number of speci-mens ↓
14 ; 15	1									1
16 ; 17	1									1
18 ; 19										
20 ; 21		2								2
22 ; 23		2	1							3
24 ; 25		1	4							5
26 ; 27		1	6	3						10
28 ; 29			4	4	1					9
30 ; 31				4	4					8
32 ; 33					3					3
34 ; 35					1	2				3
36 ; 37						1				1
38 ; 39										
40 ; 41							1			1
42 : 43										
44 ; 45							1			1
Total :	2	6	15	11	9	3	2			48

Transverse section (fig. 23). Thick epitheca involving the peripheral edges of septa. A broad zone corresponding to the flat dissepiment ring. The horse-shoe dissepiment zone is likewise broad. Lumen of horse-shoe dissepiments in the shape of elongate rectangles. The stereome coating on the horse-shoe dissepiments is meagre, being, however, quite thick on the septa in the two cardinal septum quadrants. Cardinal septum is almost flush with the adjacent septa, the counter septum is long. Septa lateraly carinate.

Longitudinal section (fig. 24). Below the epitheca there is a broad zone of flat dissepiments, 1.5 to 2 mm in width. The horse-shoe dissepiments are semi-luminate and thin-walled. Tabulae incomplete, consisting of vesiculate periaxial parts and of broad, slightly convex axial parts, commonly arranged in bundles. Exceptionally, even complete tabulae may occur.

Microstructure (fig. 23). — A thick epitheca involving also the slightly dilated peripheral edges of septa. In transverse section of septa the trabecular line has an almost uninterrupted course and together with the

fibres, owing to its dark colouration, it shows off clearly against the light background of the stereome which thickens the septum. The trabecular line has a zigzag course and alternating carinae are formed where angular indentations of the line occur. Near the cardinal septum the septa are dilated axially inward from the pseudotheca. Here on septa and on periaxial tabulae is deposited a thick coating of stereome, with structure showing parallel striation. The distinct dilation of these elements has been taking place in correlation with certain growth phases (fig. 24). The longitudinal section shows slender, tall trabecular fans with broad trabeculae (0.2 mm), bifurcating in the direction of tabularium.

Fig. 23. — *Macgeea bathycalyx amabilis* n. mut., holotype. Skały beds No. 11. Transverse section in ephebic stage; *1* cardinal septum, *2* counter septum, *3* intraseptal layer of stereome; × 5.3.

Fig. 24. — *Macgeea bathycalyx amabilis* n. mut., holotype (same specimen as fig. 23). Longitudinal section; × 3.7.

Ontogeny (fig. 25). — The ontogeny is most symptomatic and in some stages it resembles the structure of *Protomacgeea dobruchnensis*, the zaphrentoid stage being then dominant. In the early neanic stage, with diameter of 4 mm and 32 septa present, the whole interior of the corallite is seen crowded with septa dilated by stereome. It is difficult to recognize among them the long counter and the short cardinal septum, welded into the thick adjacent septa. With diameter of 8 mm there are 50 septa, the

cardinal septum is less short, while the counter septum still continues to be long (fig. 25).

Individual variability is very strong and is displayed in the shape of specimens, i.e. that the corallites may be low and broad, or like elongated cones, sometimes straight or curved. The calyx is mostly narrowed, in some specimens widened out. The septa are very slightly dilated, occasionally somewhat more so. In more mature corallites there is stronger reduction of stereome. Tabulae are broad and convex, sometimes flat or even concave, commonly disposed in bundles.

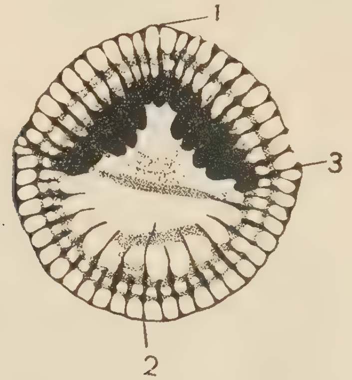

Fig. 25. — *Macgeea bathycalyx amabilis* n. mut. Skały beds No. 11. Transverse section in neanic stage; *1* cardinal septum, *2* counter septum, *3* alar septum; × 5.

Affinities and differences. — The above form has been recognized by the writer as a mutation of species *Macgeea bathycalyx* (Frech). The following are features in common with the type form: similar structure of calyx, tabularium and zaphrentoid stage of ontogeny. Most closely allied are the mutation *amabilis* and subspecies *josephi*. The differences lie in the tabulae being broad, the septa around the cardinal septum quadrants strongly dilated and the cardinal septum of the *amabilis* mutation evened up with the adjacent septa during the late neanic and ephebic stages, and the counter septum being longer.

Genus *Thamnophyllum* Penecke, 1894
Thamnophyllum skalense n. sp.

(fig. 26-29; table 4)

Holotype: fig. 26, 27*A*.

Material. — 155 polished specimens set in hard limestone (beds No. 5). Also 44 transverse and longitudinal thin sections have been prepared.

Diagnosis. — The corallites are slight, subcylindrical, with parricidal and peripheral increase, they average about 5 mm in diameter and have about 21 major septa. These are straight, peripherally dilated, forming together with the thick-walled horse-shoe dissepiments an almost con-

solidated pseudotheca. Axial edges of septa thin, leaving about 1 mm of free space. Tabulae incomplete, convex, with supplementary plates.

Macroscopic description (fig. 27). — The shape is known from longitudinal thin sections only. The corallites are elongated, subcylindrical, sometimes somewhat twisted and transversely narrowed. They produce a talon by which they are attached to the bottom, most frequently to *Thamnopora* or to the laminar *Coenites*. The surface is covered by a thin epitheca which is preserved in some places. It has not been ascertained what level the epitheca had reached and whether it terminated below the calicular margin. Where the epitheca is preserved, a row of flat and broad dissepiments is to be seen below it. These are commonly masked by broad trabecular fans with lines of divergence on horse-shoe dissepiments. The latter are markedly thick-walled and together with the closely spaced trabecular fans they form a conspicuous pseudotheca. The tabulae are convex and consist of dilated, convex, axial parts and of vesiculate, periaxial parts. The calyx is broad, deep, with steep walls and convex floor.

The *transverse section* (fig. 26) shows a thin epitheca and peripheral edges of septa terminating in the epitheca. In some specimens the pseudotheca is nearly consolidated with dissepiments, seen through only here and there. Within the horse-shoe dissepiments the septa are dilated to a spindle-like shape. After leaving the pseudotheca they attenuate and do not reach the axis. As is specified in the attached table 4, the number of septa is dependent on the diameter of calyx.

Fig. 26. — *Thamnophyllum skalense* n. sp., holotype. Skały beds No. 5. Transverse section; × 7.

Microstructure (fig. 27). — It is here most characteristic for genus *Thamnophyllum*. The trabecular fans consist of wide trabeculae, separated by a crack. Composite sclerodermites of fibre fascicles are grouped along a dark line. The transverse section shows a light transparent epitheca and within it the septal ends. Septal trabeculae have long fibres, particularly so in the spindle-like dilated part. The pseudotheca is made up of thick-walled horse-shoe dissepiments and of spindle-shaped dilated

septa. These, in addition to closely spaced long fibre trabeculae, also have a thick lateral cover of stereome.

Fig. 27. — *Thamnophyllum skalense* n. sp., holotype. Skały beds No. 5. *A* longitudinal section of corallite with peripheral buds, × 4.4; *B* longitudinal section with 2 parricidal buds; × 5.

Table 4

Correlation between the number of septa and the diameter of calyx in *Thamnophyllum skalense* n. sp.

Number of major septa \ Diameter of calyx (*in mm*)	2	3	4	5	6	7	8	Number of specimens ↓
10 ; 11	1							1
12 ; 13	1	1						2
14 ; 15		4	3					7
16 ; 17			3	1				4
18 ; 19			4	4	3			11
20 ; 21			1	16	4			21
22 ; 23				2	6	3	3	14
24 ; 25						3	2	5
26 ; 27							4	4
Total :	2	5	11	23	13	6	9	69

Ontogeny (fig. 28*A*). — After attachment and while building up its skeleton the larva produced a talon consisting of elongated septa and transverse dissepiments. The talon is placed on the side of the cardinal septum. The youngest corallite is 1.5 mm in diameter (without talon) and with 8 septa inside the calyx. In the next stage bilateral symmetry is very conspicuous (fig. 29). The corallite is then 2.5 mm in diameter (without talon) and has 12 longer septa. On the side of the cardinal septum the talon is very wide. Bilateral symmetry is made conspicuous in the first place by the pinnate arrangement of septa within the talon. The cardinal and counter septa are not differentiated by any particular length. Pinnately arranged younger septa appear below the alar septa.

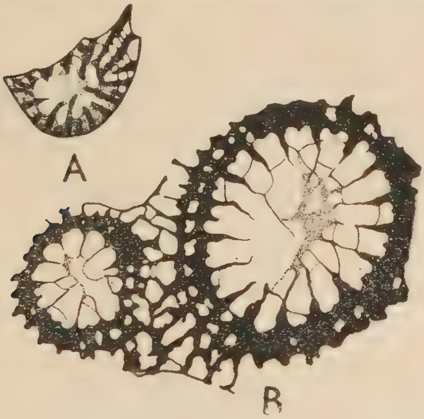

Fig. 28. — *Thamnophyllum skalense* n. sp. Skały beds No. 5. *A* transverse section in immature stage with talon × 6.7; *B* transverse section of parent calyx with bud; × 6.6.

Fig. 29. — *Thamnophyllum skalense* n. sp. Skały beds No. 5. Transverse section of stage somewhat later than in fig. 28*A*, with talon; *1* cardinal septum; × 10.

Increase is of twofold type. The parricidal is more common, but peripheral increase also occurs. The increase is parricidal when two buds are laid down in the calyx of the parent corallite, separated by a transparent epitheca. On the inner side the buds are connected (fig. 27*B*) by dissepimental tissue. This tissue appears in association with young buds only and has, therefore, by E. D. Soshkina (1953) been called „cenogenetic tissue".

Individual variability is very strong and is made particularly conspicuous by the shape of the corallite, its internal morphology and mode of increase. The shape is markedly differentiated. Individuals in the shape of a wide, low cone will be found together with erect cylindrical forms. Internal morphology is subject to individual variations: tabulae may be either complete, flat or convex and incomplete, the horse-shoe dissepi-

ments may either be larger and thin-walled or minute and thick-walled. The pseudotheca is then either continuous or porous. Mode of increase varies greatly as has been specified above. The following are the constant diagnostic features of this species: diameter usually about 5 mm, with 20-21 major septa, markedly straight, spindle-like septa not extending to the axis. Tabulae are always convex, with supplementary plates, and incomplete.

Affinities and differences. — By its constant characters *Th. skalense* comes nearest *Th. trigemme*, from which it differs in only 2 buds being always produced by parricidal increase instead of from 3 to 5; in the strong spindle-like dilation of the septa within the pseudotheca, resulting in lateral contiguity, in the average number of septa in correlation with the diameter, in globose, thick-walled horse-shoe dissepiments; in tabulae which are frequently covered by a thick deposit of stereome and show supplementary axial plates. *Th. skalense* differs from its allied species *Th. caespitosum* by parricidal increase and consolidated pseudotheca.

Occurrence. — As far as the writer is able to ascertain, this species occurs in *Calceola* limestone (beds No. 5).

Thamnophyllum caespitosum (Goldfuss)

(fig. 30-32)

1881. ***Fascicularia caespitosa*** Goldf.; C. Schlüter, Über einige Anthozoen.... p. 103, pl. 9, fig. 6, 7.
1896. ***Fascicularia caespitosa*** var. *striata* Gürich; G. Gürich, Das Paläozoicum..., p. 168, 169.
1935. ***Disphyllum (Phacelophyllum) caespitosum*** Goldf.; W. D. Lang & S. Smith, Cyathophyllum... p. 573, fig. 28, 29.
1949. ***Phacelophyllum caespitosum*** Goldf., E. C. Stumm, Revision..., pl. 17, fig. 11—13
1949. *Macgeea (Thamnophyllum) caespitosum* Goldf.; A. v. Schouppé. Die Thamnophyllen..., p. 138-152, fig. 3, 40-43.
1950. *Disphyllum (Phacelophyllum) caespitosum* Goldf.; P. W. Taylor. The Plymouth Limestone, p. 186, pl. 3, fig. 3a, b.

Material. — This species is rather uncommon, it is characteristic of marly limestones. 15 specimens have been collected from beds No. 8, of which 13 microscopic thin sections have been prepared, 2 specimens are from beds No. 12, 1 — from Kamieniec. The marly limestones from beds No. 8 are rusty, zoogenic or rather phytogenic, packed with calcareous algae arranged in chain-like rows.

Diagnosis. — Branchy colonies with lateral increase; the corallites average about 6 mm in diameter and have about 20 major septa, thin, not extending to the axis; tabulae incomplete, flat; in immature stage there is a talon.

Macroscopic description. — The specimens are embedded in limestone; their shape is distinguished on polished surfaces and in thin sections. It is feebly branched; with two lateral buds laid down nearly at right angle in relation to the parent specimen.

The following inter-relation between number of septa and diameter of calyx may be asserted from transverse thin sections:

Diameter of calyx (*in mm*)	Number of major septa
3	14
5	17 ; 18
6	20 ; 21
8	22

In *transverse section* (fig. 30) the calyx is circular. The corallite is involved in a thin epitheca. Conspicous pseudotheca is formed of two concentric rings. The horse-shoe dissepiments have the appearance of

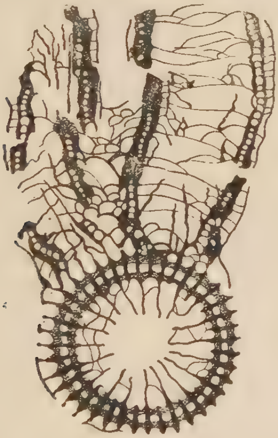

Fig. 30. — *Thamnophyllum caespitosum* (Goldfuss). Skały beds No. 8. Transverse section of parent corallite showing two lateral buds in longitudinal section; × 4.

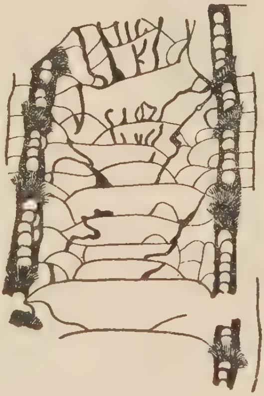

Fig. 31. — *Thamnophyllum caespitosum* (Goldfuss). Skały beds No. 8. Longitudinal section of corallite; × 5.3.

large rectangles. Septa within the pseudotheca somewhat dilated. Minor septa hardly extend beyond the inner wall of pseudotheca. Major septa attenuate and occasionally sinuous within the tabularium, they do not reach the axis leaving free an area, 1.5 mm in diameter.

Longitudinal section (fig. 31) shows a row of flat, widely spaced dissepiments, contiguous with the epitheca. Horse-shoe dissepiments globose,

tall, with large lumen and thickened walls. Tabulae incomplete, axially convex, their periaxial parts widely spaced, large and vesiculate.

Increase is lateral (fig. 30, 32). From 2 to 3 buds are attached to the parent calyx at an angle of 90° and are formed directly on the pseudotheca. One epitheca involves both the parent calyx and the bud. A few vesicles belonging to the dissepiments of the cenogenetic tissue are noticed between the septa of the parent specimen and the bud. Flat dissepiments and thick-walled horse-shoe dissepiments are formed under the epitheca of the bud, almost in the earliest stage.

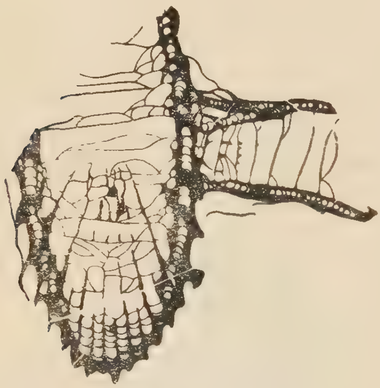

Fig. 32. — *Thamnophyllum caespitosum* (Goldfuss). Skały beds No. 8. Longitudinal section of corallite with lateral bud; × 3.7.

Affinities and differences. — Our specimens agree well with the description given by W. D. Lang and S. Smith (1935). They, however, differ considerably from the corallites described by W. Dybowski (1873) as *Fascicularia kunthi* Dames from Mokrzeszów (Oberkunzendorf), which A. Schouppé (1949) regards as a variety, namely *Macgeea (Thamnophyllum) caespitosa* (Goldfuss) var. *minus* (Roemer). The Upper Frasnian Sudeten specimens are slight (4 mm) and of irregular shape, owing to frequent lateral increase and lateral processes connecting the adjacent corallites. The septa are spirally curved in the axis of the calyx. The tabulae are usually concave, as has been well figured by W. Dybowski (1873).

Occurrence. — A. Goldfuss has described this species from the Middle Devonian of Bensberg (Eifel Mts.).

Thamnophyllum trigemme (Quenstedt)

(fig. 33, 34; table 5)

1894. *Thamnophyllum trigeminum* (Quenst.); K. A. Penecke, Das Grazer Devon, p. 596, pl. 8, fig. 4-6.

1935. *Disphyllum (Phac.) trigemme* (Quenst.); W. D. Lang & S. Smith, Cyathophyllum..., p. 4, fig. 30, 31.

1949. *Macgeea (Thamnoph.) hörnesi* (Pen.) var. *trigemme* (Quenst.); A. v. Schouppé, Die „Thamnophyllen"..., p. 131-135, fig. 5, 6, 8, 9, 17a, 29.
1949. *Thamnophyllum trigemme* (Quenst.); E. D. Soshkina, Devonskie korally..., p. 78, 79, pl. 32, fig. 1-3.
1952. *Thamnophyllum trigemme* (Quenst.); E. D. Soshkina, Opredelitel..., p. 85, pl. 18, fig. 70.
1953. *Thamnophyllum trigemme* (Quenst.); E. D. Soshkina, Cenogeneticeskie..., p. 85, fig. 7.

Material. — A species very common in the Givetian from Skały. Numbers of specimens collected by the writer in the several strata are as follows:

14	specimens	from	beds	6
28	„	„	„	8
15	„	„	„	10
72	„	„	„	12

They are mostly simple fragmentary corallites, 16 of them being budding specimens. Seven transverse and longitudinal thin sections have been prepared.

Diagnosis. — Cylindrical corallites with parricidal increase, averaging about 7 mm in diameter and having about 23 thin major septa. Tabulae incomplete, flat or convex axially, convex and inclined periaxially. Large, globose horse-shoe dissepiments. There is a talon during the early ontogeny.

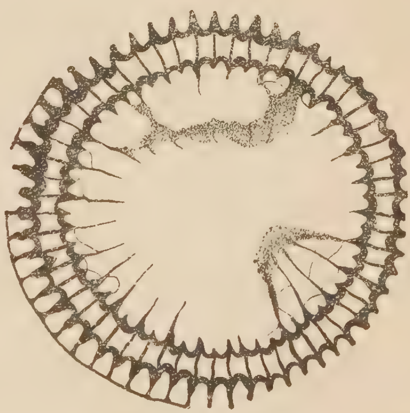

Fig. 33. — *Thamnophyllum trigemme* (Quenstedt). Skały beds No. 12. Transverse section in ephebic stage; × 5.

Macroscopic description. — Specimens of this species are branchy in shape. Parricidal buds, usually 3-5 in number are laid down in the parent calyx, rapidly extending over the entire diameter and bending horizontally from the calyx. Within the parent calyx the buds are united by intraepithecal tissue, „cenogenetic" after E. D. Soshkina (1953). Epithecal

rings with delicate concentric striation are noted on the surface; "costae" occur when the epitheca is damaged. Margin of calyx always damaged.

Description of sections (fig. 33). — Circular calices are shown in transverse section. As has been specified in the attached table 5, the most frequent diameter is that 6 to 8 mm; while the corresponding number of septa is 40 to 50. The calyx is involved in a thin epitheca. Even within the pseudotheca the septa are thin, the longer septa descend somewhat into the calyx, over two thirds or three fourths of the radial length. Shorter septa extend slightly beyond the inner wall of the horse-shoe dissepiments. In transverse section the horse-shoe dissepiments appear as large rectangles since their walls are but feebly dilated.

Longitudinal section (fig. 34*A*) shows incomplete tabulae; they are complete very rarely only. The axial part is wide, convex or flat, the periaxial part being convex, usually wide. The epitheca has been preserved less often, disclosing a row of horizontal, wide-spaced flat dissepiments. Horse-shoe dissepiments thin-walled, globose.

Table 5

Correlation between the number of septa and the diameter of calyx in *Thamnophyllum trigemme* (Quenstedt)

Diameter of calyx (*in mm*) / Number of major septa	3	4	5	6	7	8	9	10	Number of specimens ↓
16; 17	1	1	1						3
18; 19		2	2	1					5
20; 21			4	9	6				19
22; 23			2	13	15	3			33
24; 25					10	11	3		24
26; 27					5	7	3		15
28; 29							3	5	8
Total:	1	3	9	23	36	21	9	5	107

Ontogeny. — The proximal end, conically pointed, is preserved in one specimen only, where it is provided with a talon encircling the minute skeleton of some tabulate coral.

Increase is parricidal (fig. 34*B*). From 3 to 5 buds are produced by a calyx, 7-10 mm in diameter. The buds are laid down near the last tabula in the calyx. They envelop themselves with a thin epitheca and first produce complete convex tabulae. Horse-shoe dissepiments are sometimes produced early, but in one case not before the length of 7 mm is

attained. The buds are united by means of the intraepithecal tissue which persists in the parent calyx only.

Individual variability is strong. It is demonstrated in the differentiated shape of the corallite which may be straight or curved; some specimens show constrictions and attain maturity with diameter not more

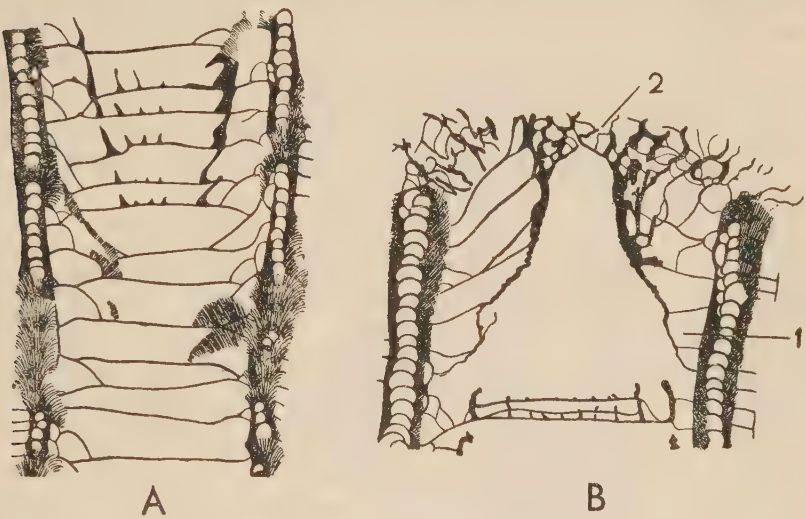

Fig. 34. — *Thamnophyllum trigemme* (Quenstedt). Skały beds No. 12. *A* longitudinal section of specimen in fig. 33, × 5; *B* longitudinal section with two parricidal buds, × 5; *1* parricidal bud, *2* cenogenetic tissue.

than 7 mm, while others not before the diameter is 10 mm. There are from 3 to 5 buds, but sometimes one only. In transverse section some septa are extremely thin, almost in an even line, while others are dilated in a distinctly spindle-like shape. The horse-shoe dissepiments always occur as large quadrangles, they may be tall, ovate or wider, sub-globose. The tabulae may be crowded or widely spaced, if so, complete.

Affinities and differences. — Both in structure of calyx and of tabularium the above described species comes closest to *Thamnophyllum caespitosum*. It differs in the mode of increase foremost, since in *Th. caespitosum* this is always lateral, while in *Th. trigemme* it is parricidal. Moreover, in *Th. caespitosum* the diameter is small, never exceeding 8 mm with 44 septa. It is most common for this form, however, to have 20 major septa and a diameter of 6 mm, whereas in *Th. trigemme*, calices with 7 mm in diameter and with 22-23 major septa, predominate, as is specified in the accompanying table 5. A. Schouppé (1949) has also asserted the close resemblance of these two species, quoting *Th. trigemme*, however, as a variation of *Th. hoernesi*. An extensive lapse of time divides

these forms as *Th. hoernesi* belongs to the „barrandei level", after W. D. Lang and S. Smith (1935), while *Th. trigemme* is of Middle Givetian age. Moreover, these two species differ in the structure of tabulae, which are concave and always complete in *Th. hoernesi,* while in *Th. trigemme* they are convex and incomplete. *Th. hoernesi* is with a larger diameter of calyx — from 15 to 20 mm — with horse-shoe dissepiments strongly narrowed owing to stereome cover.

Occurrence. — In Poland this species is recorded from the Middle Givetian of Skały, in beds No. 6, 8, 10, 12, also from Miłoszów. In palaeontological works it is quoted from the Middle and Upper Givetian and Lower Frasnian of the Eifel Mts., Austria, Great Britain and U. S. S. R. (the Russian Platform and the Ural).

Thamnophyllum trigemme pajchelae n. subsp.

(fig. 35, 36; table 6)

Holotype: fig 35*A*, *B*.

Material. — 141 damaged specimens, recovered from marly shales of Skały (beds No. 11). Of these about one third are budding specimens. 18 transverse and longitudinal thin sections have been prepared. Two thin sections show the presence of a talon.

Diagnosis. — Corallites slender and cylindrical, most commonly with a diameter of 4 mm, usually with 16-17 major septa, producing three to five parricidal buds. In the immature stage they display a talon and bilateral symmetry. The tabulae are flat and complete. Horse-shoe dissepiments thick-walled. Within the pseudotheca the septa are strongly dilated to a spindle-like shape. In major septa the axial parts are thin and straight, almost reaching the axis; minor septa slightly extend beyond the inner wall of the horse-shoe dissepiments. The epitheca is frequently preserved.

Macroscopic description (fig. 36). — Slender dendritic colonies producing from two to five buds. These soon bend upward. The buds are united and covered by an epitheca with delicate concentric striation. The calicular margin is rounded, the septa low, nearly even at the border of pseudotheca. The epitheca terminates 1 mm below the calicular margin and is often in a satisfactory state of preservation. The surface of the corallite is then pretty smooth. All the specimens are damaged, it is hence hard to ascertain at what level the budding occurs. The buds are produced even with diameter of only 3 mm, most commonly however when diameter reaches 4 and 4.5 mm. The calyx is deep with vertical walls and flat floor.

Description of sections. — The transverse section (fig. 35*A*) shows off well the circular calyx with a thin epitheca. The peripheral septal edges,

which extend beyond the pseudotheca, are thin; within the pseudotheca the septa are so strongly dilated to a spindle-like shape as to be sometimes laterally contiguous. The axial septal edges are thin. Within the pseudotheca septa of both orders are of the same thickness, though the minor septa scarcely extend beyond the inner ring of the pseudotheca. The horse-shoe dissepiments are thick-walled so that in transverse section their lumen is markedly small.

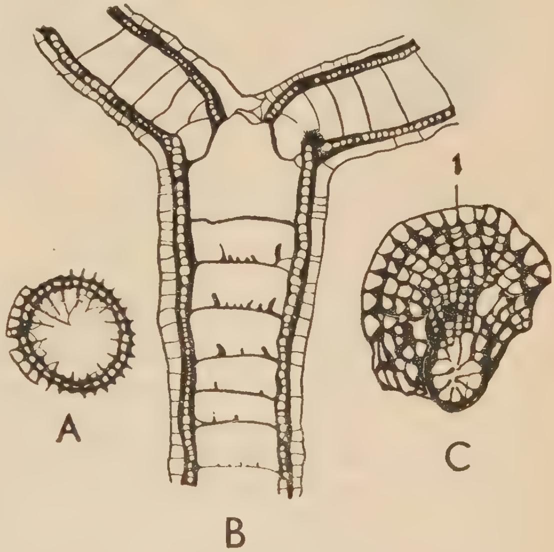

Fig. 35. — *Thamnophyllum trigemme pajchelae* n. subsp., Skały beds. No. 11. *A* transverse section in ephebic stage, × 4,5; *B* longitudinal section of same specimen with two parricidal buds, × 5,3; *C* transverse section of immature stage with talon, × 5,3; *1* cardinal septum.

Longitudinal section (fig. 35*B*) shows well preserved epitheca, thin horizontal or slightly concave dissepiments and a contiguous row of horse-shoe dissepiments with thick walls. The tabulae are flat, straight, complete, arranged as steps of a ladder; they may be with supplementary lateral oblique plates. The complete tabulae are here a characteristic feature of both immature and adult specimens.

Microstructure. — In septa the centres of calcification within the pseudotheca are crowded with long fibres, laterally bent to the sides. Within each of the two rings the septa are swollen owing to a layer of stereome and together with the strongly dilated horse-shoe dissepiment wall they form the outer and inner rings of the pseudotheca. Owing to fossilization the shape of septa is clearly indicated. In longitudinal section the horse-shoe dissepiments are with a thick lateral layer of stereome, their upper wall being less swollen. The fans are small. The sclerodermites, disposed in bundles, have a pinnate upward arrangement.

Ontogeny (fig. 35*C*). — The youngest stages investigated by the writer are those of the „skalense" type. The calyx, with a diameter of 1.5 mm and 12 septa, follows distinctly bilateral symmetry. This is clearly indi-

Fig. 36. — *Thamnophyllum trigemme pajchelae* n. subsp. Skały beds No. 11. Corallite with 5 parricidal buds masked by an epitheca; × 2.5.

cated by the talon being with prolonged septa pinnately disposed in relation to the cardinal septum. Thus, the cardinal septum seems to be set in a groove formed by the laterally bending metasepta. Neither the cardinal nor the counter septa are differentiated in length. With diameter of 2.5 mm and 24 septa there is distinct radial symmetry, the talon not having persisted. The increase is exclusively parricidal. From 2 to 5 buds are laid down within the calyx, just above the last tabula (fig. 35*B*). They are connected in the calyx by cenogenetic tissue, externally covered by the epitheca (fig. 36).

Individual variability. Specimens of this species ordinarily display rather uniform structure. Slender, stem-like und unusually fine shaped, they differ in the number of buds only. Internal morphology differs in different thickness of septa and of horse-shoe dissepiments. The tabulae are more or less widely spaced, the supplementary tabulae vary.

Affinities and differences. — The above species shows great similarities with *Th. trigemme* in their parricidal mode of increase. The differences lie in the growth of *Th. trigemme pajchelae* having suffered some check and in the simplification of its internal structure. *Th. trigemme pajchelae* is mostly with a diameter of 4 mm and with 16-17 major septa.

Table 6

Correlation between the number of septa and the diameter of calyx in *Thamnophyllum trigemme pajchelae* n. subsp.

Number of major septa \ Diameter of calyx (*in mm*)	2	3	4	5	6	7	Number of specimens
10 ; 11							
12 ; 13	1	5					6
14 ; 15		14	6				20
16 ; 17		3	23	2			28
18 ; 19			1	2			3
20 ; 21			1	4			5
22 ; 23				2	5	3	10
24 ; 25						1	1
Total:	1	22	31	10	5	4	73

Th. trigemme is mostly 7 mm in diameter and has 22-23 major septa. Additional differences consist in the constant occurrence of complete tabulae in *Th. trigemme pajchelae*, in strong dilation of pseudotheca and in frequent parricidal increase.

E. D. Soshkina (1954) described from the Semilukskie beds of the Russian Platform *Th. petinense* Sosh. with a similarly small diameter of from 4 to 5 mm, few septa (28-32) and complete tabulae. In the Russian species, however, the increase is lateral. In *Th. virgatum* Soshkina (1952), from the Frasnian of the Ural and Timan, corallites have been recorded of cylindrical shape, similarly slender, with diameter of 4-4.5 mm and 36-40 septa, but their mode of increase is lateral, while the major septa are spirally curved to one side.

Occurrence. — This species is recorded only from strongly arenaceous marls in beds No. 11.

Genus *Pachyphyllum* Edwards & Haime, 1850

Pachyphyllum sobolewi n. sp.

(fig. 37-39)

1904. *Phillipsastraea hennani* Lonsd.; D. Sobolew, Devonskija ..., p. 38. 39, pl. 5. fig. 1, 2. 2a. 3. 3a.

Holotype: fig. 37-39.

Material. — Fragments of colonies from the Kamieniec reef (the longest fragment 60 cm in length), 3 specimens. 9 specimens from Pokrzywianka Górna (beds No. 15). 17 transverse and longitudinal thin sections have been prepared.

Diagnosis. — Colonies plocoid; greatest diameter of corallites 12 × 18 mm, with 42 slender septa of almost uniform thickness; major septa not reaching the axis, minor septa somewhat shorter. Spindle-like dilations inconspicuous, peripheral ends sinuous, quite minute, widely spaced carinae. Convex incomplete tabulae. Wide thin-walled horse-shoe dissepiments. Trabecular fans resting on a row of horse-shoe dissepiments and consisting of minute and closely packed trabeculae. Extremely thin-walled dissepiments. Intercalicinal increase.

Macroscopic description. — The transverse section in fig. 37 shows large irregularly shaped calices with numerous septa.

Over the entire length the septa are thin, with barely distinguishable dilation within the pseudotheca, which is formed of rather closely spaced dissepimental rings. Both major and minor septa are uniformly thin, the minor being only very little shorter than the major and with axial edges

Average diameter (*in mm*)	Number of major septa	Diameter of central space (*in mm*)
6	13	1
7	15; 16	1
9	15	1.2
11	19; 20	1.5
12	19	1.5
13	18; 19; 20	1.5
14	19; 21	1.5
15	19; 20; 21	1.5
16	20; 21; 23	1.5
17	21; 22	1.5

slightly extending beyond the rings of the horse-shoe dissepiments. Axial edges of major septa do not reach the axis, leaving a central, exposed area. 1-1.5 mm in diameter. The septa are straight or delicately zigzag.

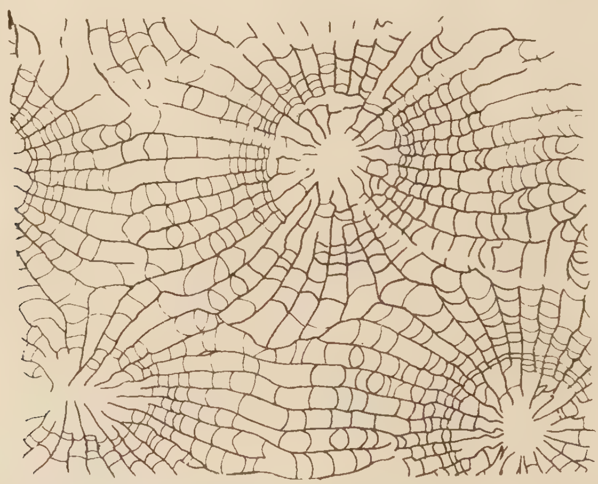

Fig. 37 — ***Pachyphyllum sobolewi*** n. sp., holotype. Skały, Pokrzywianka beds. Transverse section of plocoid colony; × 3.

showing minutely carinate curves; their peripheral edges are frequently somewhat curved. There is no wall between the calices. The septa either have the ends free or curved and contiguous with the septa of the adjacent calices; some elongate passing without interruption into the septa of the adjacent calyx.

Longitudinal section (fig. 38). The tabularium is 4 mm in diameter; the tabulae are convex, often incomplete, with supplementary plates. The periaxial parts are tall, vesiculate. The horse-shoe dissepiments flat, wide,

cap-like; the larger ones containing the smaller. The dissepimental tissue descends from them steeply, outward.

Microstructure (fig. 38). — The septa are built up of quite minute trabeculae so closely packed together that the fibres have an almost

Fig. 38. — *Pachyphyllum sobolewi* n. sp. Longitudinal section of one individual from the same colony as in fig. 37, × 5.3.

parallel course, particularly so in the somewhat dilated septal part. The zigzag curvings of the septa due to trabeculae pushed out of the trabecular line in the transverse section of septa. The carinae are widely spaced and very minute, they occur in the zigzag curves. In longitudinal section the trabecular fans are shown to be wide, the line of divergence being on the horse-shoe dissepiment. The trabeculae are straight, very thin and extremely crowded. Thin-walled horse-shoe dissepiments are to be seen through the misty fans.

Increase. — Thin section of fig. 39 shows two young intercalicinal buds, sometimes apparently quite non-contiguous with the calices. The peripheral edges of the young septa are free, they develop between the septa of the adjacent mature calices. The axial edges of the young septa are short leaving exposed a proportionately large space, as much as one fifth part of the calicular diameter. The young septa are uniformly thin over nearly the entire length, curving in a zigzag manner.

Individual variability is not conspicuous. All the calices are of irregular shape, usually lacking the outer wall, sometimes, however, their septa unite to form a pseudotheca. All the septa are uniformly thin and curved. The carinae are only occasionally somewhat more closely spaced.

The tabulae vary, being complete or incomplete, but always gently convex.

Affinities and differences. — This species, as far as the writer's knowledge goes, is the only form recorded from the Givetian. Frasnian forms are all different, being more massive.

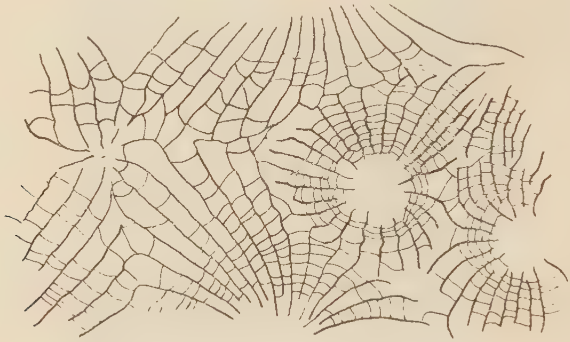

Fig. 39. — *Pachyphyllum sobolewi* n. sp. Transverse section of colony with two intercalicinal buds from the same colony as in fig. 38; × 5.

Remarks. — Though genus *Pachyphyllum* has not, thus far, been recorded from the Middle Givetian, the writer assigns the here described specimens to genus *Pachyphyllum* on the presence of horse-shoe dissepiments and symmetrical trabecular fans. D. Sobolew (1904) described this species under the name of *Phillipsastraea hennani* Lonsdale. Dr. S. Smith, to whom a specimen was sent by the writer in 1954, for the purpose of comparison with the holotype, has ascertained that our specimens are different from *Phillipsastraea hennani* Lonsdale and that they are a new species.

Occurrence. — So far, specimens of this species have only been collected from the reef facies of the „Pokrzywianka beds" of Skały (Kamieniec) and of Pokrzywianka Dolna. Its faunal association, namely: *Heliolites* sp., *Schizophyllum acanthicum Sparganophyllum* sp., *Litophyllum* sp. and *Nardophyllum* sp. confirm the age of the reef as being Middle Givetian.

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Poznań Branch
Poznań, June 1956

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MARIA RÓŻKOWSKA

PACHYPHYLLINAE ZE ŚRODKOWEGO DEWONU GÓR ŚWIĘTOKRZYSKICH

Część I

Streszczenie

WSTĘP

Praca niniejsza jest częściowym wynikiem zespołowych badań nad fauną dewonu w profilu Grzegorzowice-Skały-Włochy w Górach Świętokrzyskich. Moim zadaniem jest opracowanie koralowców czteropromiennych, najpierw z podrodziny Pachyphyllinae. W 1953 r. ukazała się część moich badań, obejmująca Pachyphyllinae z górnego dewonu obszaru Kieleckiego. W niniejszej pracy opisane są formy środkowo-dewońskie. Fauna pochodząca z żywetu zebrana została w latach 1946 oraz

1953-54 w Skałach. Materiały eifelskie wyeksploatowano w Grzegorzowicach i Wydryszowie w latach 1953 i 1955 w związku z pracami prowadzonymi przez mgr M. Pajchlową.

Niniejsza praca zawiera, obok charakterystyki litologicznej i faunistycznej zbadanych utworów (fig. 1 i zestawienie na str. 278 tekstu angielskiego), przede wszystkim opis gatunków, podgatunków i mutacji podrodziny Pachyphyllinae. Zagadnienia ogólne, jak zmienność form, filogeneza, paleogeografia, paleoekologia itd., zostaną przedstawione w części II tej pracy.

Część systematyczna obejmuje opis 12 gatunków i podgatunków z podrodziny Pachyphyllinae. Oprócz 3 znanych gatunków: *Macgeea bathycalyx bathycalyx* (Frech), *Thamnophyllum caespitosum* (Goldfuss) i *Th. trigemme* (Quenstedt), pozostałe uważam jako nowe.

Niżej podaję diagnozy opisanych form, pełne ich opisy natomiast podane są w tekście angielskim.

OPIS FAUNY

Protomacgeea n. gen.

(genotyp *Protomacgeea dobruchnensis* n. sp., fig. 2-4)

Diagnoza. — Drobne korality osobnicze w kształcie wydłużonego stożka, całkowicie osłonięte epiteką. Głęboki kielich zajmuje więcej niż połowę wysokości koralita. Septa I rzędu przeważnie silnie poszerzone stereomą[1], nieciągłe (części peryferyczne oddzielone od osiowych stożkiem zwartej sklerenchymy[2]), wypełniające prawie całe światło koralita w części proksymalnej, zaś krótkie w dystalnej. Septum główne zredukowane prawie całkowicie, na jego miejscu fossula. Septum przeciwległe długie. Septa II rzędu nie wychodzące poza strefę płaskich dissepimentów. Tabule kompletne i niekompletne, poziome lub wklęsłe, silnie zgrubiałe. Istnieje pedicillum. W ontogenezie przejawia się przewaga septum przeciwległego, a redukcja septum głównego. Mikrostruktura septów trabekularna, układ guzków trabekularnych na bokach septów wachlarzowaty.

Protomacgeea dobruchnensis n. sp.

(holotyp fig. 2-4)

Diagnoza. — Drobne korality osobnicze, stożkowate, całkowicie pokryte epiteką i opatrzone pedicillum. Najczęstsza długość 15 mm, średnica 4-5 mm, liczba septów I i II rzędu 32-42. Największa liczba septów — 58 przy średnicy 9 mm. Pomiędzy epiteką i stereozoną rząd płaskich dissepimentów. Dwie kategorie septów: 1) Septa

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[1] *„Stereoma* to warstwa wapiennej substancji różnej grubości nałożona wtórnie na septa oraz podobne struktury" (R. R. Shrock & W. H. Twenhofel, 1953, p. 139).

[2] *„Sklerenchyma* — wapienna tkanka korali" (S. Smith, 1945).

I rzędu długie, przy czym septum główne zredukowane, na jego zaś miejscu fossula. Septum przeciwległe najdłuższe. Brak ciągłości septów w obrębie stereozony[3]. 2) Septa II rzędu krótkie, ograniczone do strefy płaskich dissepimentów. Tabule czasami niekompletne, wklęsłe lub poziome. Struktura septów trabekularna. Guzki trabekularne ułożone wachlarzowato. Silny nadkład stereomy na septach, dissepimentach i tabulach. Podkówki niewidoczne.

Macgeea bathycalyx bathycalyx (Frech)

(fig. 9, 10)

Nie miałam, niestety, dostępu do oryginalnego materiału F. Frecha. W Żywecie Skał występują jednakże formy zbliżone, które uważam za podgatunki i mutacje tego gatunku. Wybrałam jeden okaz, podobny najbardziej do gatunku Frecha. Ma on pokrój stożkowaty. W przekroju poprzecznym koralita w części proksymalnej przy średnicy 6 mm są 23 septa[4]. Septum główne jest krótkie, septa sąsiednie są prawie równoległe ustawione. Septum przeciwległe jest nieco dłuższe, niż septa sąsiednich kwadrantów. Septa I rzędu są długie, o końcach osiowych maczugowato poszerzonych. W przekroju podłużnym, długości 12 mm, widać szeroką strefę płaskich dissepimentów, podkówki o zgrubiałych ścianach oraz normalne dissepimenta obok niekompletnych, lekko wypukłych tabul.

Gatunek ten wykazuje wielką zmienność. Cechy stałe, które łączą liczne tutaj wyróżnione podgatunki, są następujące: 1) skrócone septum główne, obok niego fossula; 2) septum przeciwległe, dłuższe od sąsiednich, wyrównujące się dopiero w kielichu; 3) tabule niekompletne, mniej lub więcej wypukłe, miejscami z dodatkowymi płytkami.

Macgeea bathycalyx kasimiri n. subsp.

(holotyp fig. 12, 13)

Diagnoza. — Korality niskie, kształtu szybko poszerzającego się zgiętego stożka, rzadko opatrzone talonem; powierzchnia pokryta koncentrycznie prążkowaną epiteką, kończącą się około 3 mm poniżej brzegu kielicha. Największy okaz, długości 28 mm i średnicy 14 mm, z 33 septami, z kielichem głębokości 12 mm. Kielich głęboki, stromy, zajmujący w krańcowym przypadku 3/4 długości koralita. Septa opatrzone listewkami, dłuższe dochodzące do osi kielicha, przy czym główne septum nieco krótsze, w fossuli, przeciwległe zaś dłuższe od sąsiednich. Szerokie, płaskie dissepimenta; drobne, grubościenne podkówki. Tabule niekompletne, pęcherzykowate, z grubym nadkładem stereomy. Koniec proksymalny całkowicie wypełniony sklerenchymą. W całej ontogenezie zachowuje się symetria bilateralna.

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[3] *Stereozona*, w ujęciu D. Hill (1935), to strefa elementów strukturalnych silnie poszerzonych przez nadkład stereomy. U rodzaju *Protomacgeea* stereozoną objęty jest okółek dissepimentów-podkówek.

[4] Ilości septów, podawane w dalszych diagnozach, dotyczą septów I rzędu.

Macgeea bathycalyx josephi n. subsp.
(holotyp fig. 16, 17)

Diagnoza. — Korality o pokroju zgiętego, wydłużonego stożka, czasem opatrzone talonem. Wyraźna symetria bilateralna w całej ontogenezie. Septum główne krótsze w fossuli, przeciwległe zaś dłuższe. Listewki i guzki wydatne. Tabule niekompletne. Części przyosiowe pęcherzykowate, części osiowe wypukłe, często z dodatkowymi płytkami. Przy wysokości koralita 12 mm i średnicy 9 mm septów jest 29.

Macgeea bathycalyx regularis n. subsp.
(holotyp fig. 19, 20)

Diagnoza. — Koralit o nader regularnej budowie. Kielich w przekroju kolisty, przy średnicy 12 mm z 32 septami prostymi, wrzecionowato poszerzonymi w obrębie pseudoteki. Listewki bardzo liczne. Gruby nadkład stereomy na podkówkach i normalnych dissepimentach. Tabule niekompletne, ich części osiowe wypukłe i zebrane w wiązki.

Macgeea bathycalyx longiseptata n. subsp.
(holotyp fig. 21, 22)

Diagnoza. — Koralit subcylindryczny, w przekroju poprzecznym okrągły, z 32 septami przy średnicy 12 mm. Septa I rzędu długie; septa II rzędu o połowę krótsze. Septum główne nieco skrócone. Na septach listewki. Tabule pęcherzykowate, w części osiowej zebrane w wiązki.

Macgeea bathycalyx amabilis n. mut.
(holotyp fig. 23-25)

Diagnoza. — Korality wydłużone, lekko zgięte, rzadziej szeroko stożkowate, przeważnie posiadające talon. Epiteka kończąca się o 2 mm poniżej brzegu koralita. Na septach listewki. Kielich głęboki. Wydatna bilateralna symetria, zwłaszcza we wczesnej ontogenezie. Tabule wypukłe, niekompletne, zebrane w wiązki. Okaz największy długości 44 mm, z 44 septami przy średnicy 16 mm.

Thamnophyllum skalense n. sp.
(holotyp fig. 26, 27A)

Diagnoza. — Korality drobne, subcylindryczne, pączkujące parycydalnie i peryferycznie, do 20 mm długości i 8 mm największej średnicy, z 27 septami. Septa proste, poszerzone, tworzące na peryferii wraz z grubościennymi podkówkami prawie zwięzłą pseudotekę. Końce osiowe septów przewężone, zostawiające około 1 mm wolnej przestrzeni. Tabule niekompletne, wypukłe, z dodatkowymi płytkami.

Thamnophyllum caespitosum (Goldfuss)

Diagnoza. — Kolonie gałęziste, pączkujące lateralnie; przy średnicy 6-8 mm jest 20-22 septów nie dochodzących do osi. Tabule niekompletne, w młodości talon.

Thamnophyllum trigemme (Quenstedt)

Diagnoza. — Korality cylindryczne, pączkujące parycydalnie, mające przy średnicy 7-9 mm 20-29 cienkich septów. Epiteka cienka. Tabule niekompletne, płaskie lub wypukłe w części osiowej, wypukłe i ukośne w części przyosiowej. Podkówki kuliste, duże. We wczesnej ontogenezie talon.

Thamnophyllum trigemme pajchelae n. subsp.
(holotyp fig. 35*A, B*)

Diagnoza. — Korality cylindryczne, cienkie, najczęściej średnicy 3-4 mm. wtedy przeważnie mające 16-17 septów, wytwarzających 3 do 5 pączków parycydalnych. W młodości istnieje talon i symetria jest bilateralna. Tabule proste, kompletne. Podkówki owalne, grubościenne. Septa w obrębie pseudoteki silnie wrzecionowato poszerzone. Septa I rzędu mają osiowe części cienkie, proste, podchodzące prawie do osi. Septa II rzędu wychodzą nieznacznie poza wewnętrzną ścianę podkówek. Epiteka często zachowana.

Pachyphyllum sobolewi n. sp.
(holotyp fig. 37-39)

Diagnoza. — Kolonie plokoidalne, korality o największej średnicy 12×18 mm, z 22 cienkimi septami prawie równej grubości. Septa I rzędu nie dosięgają środka; septa II rzędu są nieco krótsze. Wrzecionowate zgrubienia nieznaczne, końce peryferyczne powyginane, listewki bardzo drobne, rzadkie. Tabule wypukłe, niekompletne. Podkówki szerokie, cienkościenne. Wachlarze trabekularne oparte o rząd podkówek, złożone z bardzo drobnych i gęsto umieszczonych beleczek. Dissepimenta bardzo cienkościenne. Pączkowanie interkalicynalne.

OBJAŚNIENIA DO ILUSTRACJI

Fig. 1 (p. 273)

Szkic geologiczny okolic Grzegorzowice-Skały (wg danych M. Pajchlowej).

Fig. 2 (p. 281)

Protomacgeea dobruchnensis n. sp., holotyp. Grzegorzowice w. 2. Część dystalna kielicha widziana od wewnątrz (nieco schematycznie); *1* epiteka, *2* strefa płaskich dissepimentów, *3* strefa spłaszczonych prążków septalnych, *4* strefa septów blaszkowatych, *5* guzki trabekularne. × 8,5.

Fig. 3 (p. 282)

Protomacgeea dobruchnensis n. sp., holotyp. Grzegorzowice w. 3. Przekrój podłużny koralita; *1* epiteka, *2* strefa płaskich dissepimentów, *3* stereozona, *4* tabula z nadkładem stereomy. × 6.

Fig. 4 (p. 282)

Protomacgeea dobruchnensis n. sp. holotyp. Grzegorzowice w. 3. Przekrój poprzeczny w stadium efebicznym; *1* fossula na miejscu zredukowanego septum głównego, *2* fossula poniżej septum bocznego, *3* epiteka, *4* płaskie dissepimenta, *5* peryferyczne końce septów I i II rzędu, *6* stereozona, *7* osiowe końce septów I rzędu. × 12.

Fig. 5 (p. 284)

Protomacgeea dobruchnensis n. sp. Grzegorzowice w. 3. Mikrostruktura części kielicha w przekroju poprzecznym; *1* epiteka, *2* peryferyczne końce septów z linią trabekularną, *3* stereozona zbudowana z koncentrycznie ułożonych grudek sklerenchymy, *4* linie trabekularne części osiowych septów. × 66.

Fig. 6 (p. 285)

Protomacgeea dobruchnensis n. sp. Grzegorzowice w. 3. *A* przekrój poprzeczny przez pedicillum, stadium 1 (nepioniczne), × 10; *B* przekrój poprzeczny, stadium 2 (neaniczne), × 40; *C* przekrój poprzeczny, stadium 3 (neaniczne). × 23; *1* septum przeciwległe, *2* stereoma, *3* tabula, *4* septum w epitece.

Fig. 7 (p. 286)

Protomacgeea dobruchnensis n. sp. Grzegorzowice w. 3. Przekrój poprzeczny, stadium 4 (neaniczne); *1* septum główne, *2* septum przeciwległe. × 7,5.

Fig. 8 (p. 287)

Protomacgeea dobruchnensis n. sp. Grzegorzowice w. 3. Przekrój podłużny młodego osobnika z pedicillum: *1* pedicillum, *2* tabula, *3* stereozona, *4* płaskie dissepimentum, *5* epiteka. × 8.

Fig. 9 (p. 288)

Macgeea bathycalyx bathycalyx (Frech). Skały w. 8. Przekrój podłużny zbliżony do rysunku F. Frecha (1886, p. 67). × 5.

Fig. 10 (p. 288)

Macgeea bathycalyx bathycalyx (Frech); ten sam okaz. jak wyżej. Przekrój poprzeczny w stadium neanicznym; *1* septum główne. × 7,5.

Fig. 11 (p. 290)

Macgeea bathycalyx kasimiri n. subsp., paratyp. Skały w. 6. *A* wnętrze kielicha, × 4; *B* koralit widziany z boku, × 3,3.

Fig. 12 (p. 291)

Macgeea bathycalyx kasimiri n. subsp., holotyp. Skały w. 6. Przekrój poprzeczny przez jamkę kielicha; *1* septum główne. × 4,7.

Fig. 13 (p. 292)

Macgeea bathycalyx kasimiri n. subsp., holotyp Skały w. 6. Przekrój podłużny koralita młodocianego; *1* epiteka, *2* podkówki z wachlarzem trabekul, *3* płaskie dissepimentum. × 5,3.

Fig. 14 (p. 293)

Macgeea bathycalyx kasimiri n. subsp., Skały w. 6. Przekrój podłużny koralita starszego. × 5,3.

Fig. 15 (p. 294)

Macgeea bathycalyx kasimiri n. subsp. Skały 6. Przekrój poprzeczny stadium neanicznego; *1* septum główne, *2* septum przeciwległe. × 5.

Fig. 16 (p. 296)

Macgeea bathycalyx josephi n. subsp., holotyp. Skały w. 8. Przekrój poprzeczny stadium efebicznego; *1* septum główne. × 5.

Fig. 17 (p. 296)

Macgeea bathycalyx josephi n. subsp., holotyp (ten sam okaz, jak wyżej). Przekrój podłużny koralita. × 5.

Fig. 18 (p. 297)

Macgeea bathycalyx josephi n. subsp. Skały w. 8. Przekrój poprzeczny stadium neanicznego, septa silnie poszerzone sklerenchymą; *1* septum główne, *2* septum przeciwległe. × 12.

Fig. 19 (p. 298)

Macgeea bathycalyx regularis n. subsp., holotyp. Skały w. 5. Przekrój poprzeczny stadium efebicznego. × 4.

Fig. 20 (p. 298)

Macgeea bathycalyx regularis n. subsp., holotyp (ten sam okaz, jak wyżej). Przekrój podłużny. × 4,3.

Fig. 21 (p. 300)

Macgeea bathycalyx longiseptata n. subsp., holotyp. Skały w. 5. Przekrój poprzeczny stadium efebicznego; *1* septum główne. × 4,7.

Fig. 22 (p. 300)

Macgeea bathycalyx longiseptata n. subsp., holotyp. Przekrój podłużny okazu fig. 21. × 4.

Fig. 23 (p. 303)

Macgeea bathycalyx amabilis n. mut., holotyp. Skały w. 11. Przekrój poprzeczny stadium efebicznego; *1* septum główne, *2* septum przeciwległe, *3* osad stereomy między septami. × 5,3.

Fig. 24 (p. 303)

Macgeea bathycalyx amabilis n. mut., holotyp (ten sam okaz, jak wyżej). Przekrój podłużny. × 3,7.

Fig. 25 (p. 304)

Macgeea bathycalyx amabilis n. mut. Skały w. 11. Przekrój poprzeczny stadium neanicznego; *1* septum główne, *2* septum przeciwległe, *3* septum boczne. × 5.

Fig. 26 (p. 305)

Thamnophyllum skalense n. sp., holotyp. Skały w. 5. Przekrój poprzeczny. × 7

Fig. 27 (p. 306)

Thamnophyllum skalense n. sp., holotyp. Skały w. 5. *A* przekrój podłużny koralita z pączkami marginalnymi. × 4,4; *B* przekrój podłużny z 2 pączkami parycydalnymi. × 5.

Fig. 28 (p. 307)

Thamnophyllum skalense n. sp. Skały w. 5. *A* przekrój poprzeczny stadium młodocianego z talonem. × 6,7; *B* przekrój poprzeczny kielicha macierzystego wraz z pączkiem. × 6,6.

Fig. 29 (p. 307)

Thamnophyllum skalense n. sp. Skały w. 5. Przekrój poprzeczny stadium nieco późniejszego, niż na fig. 28*A*, z talonem; *1* septum główne. × 10.

Fig. 30 (p. 309)

Thamnophyllum caespitosum (Goldfuss). Skały w. 8. Przekrój poprzeczny koralita macierzystego z 2 pączkami lateralnymi w przekroju podłużnym. × 4.

Fig. 31 (p. 309)

Thamnophyllum caespitosum (Goldfuss). Skały w. 8. Przekrój podłużny koralita. × 5,3.

Fig. 32 (p. 310)

Thamnophyllum caespitosum (Goldfuss). Skały w. 8. Przekrój podłużny koralita z pączkiem lateralnym. × 3,7.

Fig. 33 (p. 311)

Thamnophyllum trigemme (Quenstedt). Skały w. 12. Przekrój poprzeczny w stadium efebicznym. × 5.

Fig. 34 (p. 313)

Thamnophyllum trigemme (Quenstedt). Skały w. 12. *A* przekrój podłużny okazu fig. 33, × 5; *B* przekrój podłużny z 2 pączkami parycydalnymi, × 5; *1* pączek parycydalny, *2* tkanka cenogenetyczna.

Fig. 35 (p. 315)

Thamnophyllum trigemme pajchelae n. subsp., holotyp. Skały w. 11. *A* przekrój poprzeczny stadium efebicznego, × 4,5; *B* przekrój podłużny tego samego okazu z 2 pączkami parycydalnymi, × 5,3; *C* przekrój poprzeczny młodocianego okazu z talonem, × 5,3; *1* septum główne.

Fig. 36 (p. 316)

Thamnophyllum trigemme pajchelae n. subsp. Skały w. 11. Koralit z 5 pączkami parycydalnymi, zasłoniętymi wspólną epiteką. × 2,5.

Fig. 37 (p. 318)

Pachyphyllum sobolewi n. sp., holotyp. Skały. w. pokrzywiańskie. Przekrój poprzeczny kolonii plokoidalnej. × 3.

Fig. 38 (p. 319)

Pachyphyllum sobolewi n. sp. Przekrój podłużny jednego osobnika z tej samej kolonii, co fig. 37. × 5,3.

Fig. 39 (p. 320)

Pachyphyllum sobolewi n. sp. Przekrój poprzeczny kolonii z 2 pączkami interkalicynalnymi z tej samej kolonii. × 5.

МАРИЯ РУЖКОВСКА

PACHYPHYLLINAE ИЗ СРЕДНЕГО ДЕВОНА СВЕНТОКРЖИСКИХ ГОР

Часть I

Резюме

В 1953 году автор представила результаты исследований над представителями подсемейства Pachyphyllinae из франского яруса Польши. В настоящей заметке она приводит описание Pachyphyllinae из эйфельского и живетского ярусов

Свентокржиских Гор в профиле Гржегоржовице—Скалы—Влохы и в Выдрышове. Рядом с литологической и фаунистической характеристикой исследованных отложений (фиг. 1 и сводка на стр. 278 английского текста), настоящая статья содержит главным образом описание видов, подвидов и мутаций подсемейства Pachyphyllinae, собранных в упомянутых ярусах. Все общие вопросы возникающие из исследований этой группы Tetracoralla будут представлены в следующей статье.

В фауне кораллов эйфеля и живета, очень разнообразной и количественно чрезвычайно богатой, Pachyphyllinae принадлежат к числу более редких форм. Автор описала отсюда 12 видов и разновидностей:

Protomacgeea dobruchnensis n. gen. & n. sp.

Macgeea bathycalyx bathycalyx (Frech)	*Thamnophyllum skalense* n. sp.
M. bathycalyx josephi n. subsp.	*Th. caespitosum* (Goldfuss)
M. bathycalyx regularis n. subsp.	*Th. trigemme* (Quenstedt)
M. bathycalyx longiseptata n. subsp.	*Th. trigemme pajchelae* n. subsp.
M. bathycalyx amabilis n. mut.	*Pachyphyllum sobolewi* n. sp.

В эйфельских мергелях и известняках Гржегоржовиц и Выдрышова содержится мелкая единичная форма *Protomacgeea dobruchnensis* n. gen. & n. sp., близкая роду *Macgeea*. Она имеет плоские диссепименты, на месте подковок развита стереозона, а трабекулярные веера отражаются только в веерообразном размещении бугорков по бокам септ.

В живетских отложениях выше упомянутого профиля род *Macgeea* представлен одним видом — *M. bathycalyx bathycalyx* (Frech). Наш экземпляр наиболее напоминающий рисунок Фреха (F. Frech, 1886, p. 6) изображен на рис. 9—10. Этот вид проявляет большую изменчивость. Автор выделила 4 формы, встречающиеся вместе, как подвиды, и одну форму — геологически более молодую — как мутацию. Все эти разновидности связывает сходная билатеральная симметрия, сохраняющаяся в течении всего онтогенеза, сходная внутренняя морфология и соответствующее количество септов при ровном диаметре чашечки.

Род *Thamnophyllum* представлен четырьмя видами, которые характеризуются типом почкования и внутренней морфологией.

В строматопорово-табулятовом рифе покрживанских слоев содержится *Pachyphyllum sobolewi* n. sp., описанный Соболевым, (1903), как *Phillipsastraea hennani* Lonsdale. Вид имеет однако черты характерные для рода *Pachyphyllum*, а в частности подковки и опирающиеся на них трабекулярные веера. *Pachyphyllum sobolewi* — это наиболее древний представитель этого рода, так как находится здесь в отложениях средней части живетского яруса, что видно по следующему составу кораллового сообщества: *Breviphrentis multiseptatus* Gürich, *Schizophyllum acanthicum* Frech, *Sparganophyllum* sp. с сильно свернутыми осевыми концами септ, *Neostringophyllum* sp. и очень редкие *Lithophyllum* sp. и *Nardophyllum* sp.

A C T A P A L A E O N T O L O G I C A P O L O N I C A

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KAZIMIERZ KOWALSKI

INSECTIVORES, BATS AND RODENTS FROM THE EARLY PLEISTOCENE BONE BRECCIA OF PODLESICE NEAR KROCZYCE (POLAND)

Abstract. — The writer gives a description of Insectivora, Chiroptera and Rodentia yielded by the bone breccia discovered by him at Podlesice near Kroczyce, in the district of Olkusz, Poland. The breccia is referred to the Günz-Mindel Interglacial. Out of the 21 forms collected there, the following have been identified as new: *Sorex alpinoides* n. sp., *Sorex dehneli* n. sp., *Myotis podlesicensis* n. sp., *Myotis danutae* n. sp., *Myotis dasycneme subtilis* n. subsp., *Glis sackdillingensis minor* n. subsp. *Baranomys langenhani* Heller is shown to be synonymous with *Baranomys lóczyi* Kormos.

INTRODUCTION

The mammalian fossil remains described in this paper have been collected from a bone breccia discovered at the village of Podlesice near Kroczyce in the district of Olkusz (19°32′ E, 50°34′ N). This locality is centrally situated in the Kraków-Wieluń Highlands, which stretch along the eastern margin of the Upper Silesian Depression. The breccia, about 4 m in thickness, infilled a funnel-like pit in Jurassic limestone, passing downwards as a wide fissure. The pit was found on the ridge of a limestone monadnock abt. 410 m a. s. l. The walls of the pit as well as those of the fissure which forms its continuation were covered with calcite concretions, products undoubtedly older than the breccia itself. At the time of its discovery the breccia had practically all been excavated from the pit and heaped on the adjacent dumphill. Some slight remnants only were there on the walls to indicate the original site of the breccia. Under the circumstances, no stratigraphic sequence could be determined within the breccia which must, therefore, be regarded as one whole.

The Podlesice bone breccia was discovered accidentally during calcite working. The piercing of the breccia down to the bottom of the funnel-like pit disclosed the entrance to a cave. The cave stretches far into the rock and contains thick beds of calcite crystals, which attracted industrial exploitation.

The author came across the breccia in 1949 and then collected an important part of it, i. e. about 500 kg in weight. Soon after he published a note reporting his discovery (K. Kowalski, 1951*a*) and recapitulated it in a paper on the caves of the Kraków-Wieluń Highland area (K. Kowalski, 1951 *b*). In 1954, in the course of research studies, done at the Institute of Palaeontology of the Warsaw University, under the guidance of Prof. Dr. Roman Kozłowski, head of the Institute, the author became acquainted with the method of preparing the breccia by treatment in acetic acid. This method allowed minute mammalian remains to be freed from the hard matrix cementing them, thus making possible further investigation work. Fragments of breccia were dissolved in 10% acetic acid, bone remains thus separated from the matrix were washed, dried and, when dry, soaked in saturated solution of shellac in alcohol.

Up to the present about 100 kg of the breccia material has been worked out. The specimens thus recovered are now deposited in the collection of the Cracow Branch of the Institute of Zoology of the Polish Academy of Sciences where this paper has been written.

The writer wishes to thank Mrs. J. Humnicka for the English translation of the difficult Polish text and Mr. A. Sulimski for the pains he has taken in preparing the drawings.

ORIGIN OF THE PODLESICE BRECCIA

The breccia here considered shows very marked petrographic differentiation. All of its portions, however, yield abundant bone remains of small mammals, mostly bats, embedded in a clay matrix with a high content of lime carbonate. In some layers the matrix consists of almost pure crystalline calcite, while clay elements predominate in other layers. Some thin layers display a dark colouration probably due to the presence of organic matter. The whole breccia is so hard that mechanic means proved of no use for the recovery of small mammalian bones. There are hardly any limestone fragments in the breccia, only few were encountered by the author in the studied material. Concretions, fairly abundant, occur, consisting of thin concentric lime carbonate layers with some silt content.

The lithological character of the discovered breccia clearly indicated that it had formed at the floor of the cave, some considerable distance from the cave entrance. The cave floor was covered by clay. It constituted the insoluble limestone residuum and is still now the essential component of the cave deposits in those parts of the cave further away from the entrance. The clay was impregnated by water dripping down from the cave ceiling and containing a saturated solution of calcite carbonate.

At times and again the surface of the cave dried up and cracks formed where calcite crystallized. Signs of these cracks are readily detectable on some fragments of the breccia. The complete lack of lime debris, commonly accumulating on floor of caves in places exposed to thermic variations which are responsible for mechanical weathering, is a proof of the formation of the breccia at some distance from the cave entrance.

Numbers of bats must have lived on the site of the breccia's formation. Dead bodies of these animals, which usually form large colonies on the ceiling of caves, dropped down onto the floor of the cave. Upon decomposition of organic matter, their bones were buried in the soft clay of the cave floor. At times of flood or of heavier rainfall the lower parts of the cave may have been inundated and the bone remains carried away by water. Consequent sorting of the bone material ensued. While skulls clearly predominate in some samples, long bones, frequently in a parallel arrangement, prevail in others. Similar concentration of skulls or long bones of bats has many a time been encountered by the present author on the floor of Tatra caves, for example in the Miętusia Cave or the Zimna Cave in Western Tatra Mts. Excellent preservation of the delicate skulls of bats and perfect condition of their long bones suggest that, as regards the material here studied, water transport could have been neither long nor very rapid.

The colony of bats, whose fossil remains occur in the Podlesice breccia was a hibernating colony. Though bats flock together in caves during the summer too, these are reproductive colonies and remains of many young individuals are always found directly underneath. Among the copious fossil material from the Podlesice breccia but one single fragment was collected of a bat mandible with milk dentition. All the other bone fragments are referable to adult individuals. Furthermore, large quantities of guano always accumulate in places directly below the summer colonies of bats and fossilized traces of it should certainly be detectable, whereas there is always complete lack of guano under hibernating colonies. The specific differentiation displayed in the bat remains from the Podlesice breccia indicates that it was a mixed hibernating colony. Besides the predominant species of *Myotis* cf. *aemulus* Heller, four other species of genus *Myotis* made up this colony. They were: *Myotis podlesicensis* n. sp., *M. dasycneme subtilis* n. subsp., *M. danutae* n. sp. and *M.* cf. *exilis* Heller. In addition to these, sporadic occurrence is noted of individuals belonging to other genera: *Rhinolophus* cf. *ferrumequinum* (Schreber), *Miniopterus schreibersi* (Kuhl) and *Plecotus crassidens* Kormos, Mixed colonies of this type are also very common in recent cave faunas. A very numerous one has for instance been recorded from the Koralowa Cave near Częstochowa, in the northern section of the Cracow-

Wieluń Highlands, consisting of *Myotis myotis* (Borkhausen), with detached specimens of *M. daubentoni* (Kuhl), *M. nattereri* (Kuhl) and *M. dasycneme* (Boie). Long-eared bats (*Plecotus auritus* (Linnaeus)) and lesser horse-shoe bats (*Rhinolophus hipposideros* (Bechstein)) (K. Kowalski. 1953) also hibernate in the said cave.

Fair abundance of rodent incisors is a most characteristic feature of the studied breccia. These teeth are found in quantities disproportionately high to other rodent remains. They are also recovered from layers yielding no other bone remains except those of bats. Similar occurrences have frequently been recorded by the writer from Tatra caves where detached incisors of Microtinae will be encountered among bat bones in cave deposits quite distant from the cave addit. These teeth have probably been transported by water from the ground surface through the rock fissures. Rodent incisors are markedly resistant against agents of destruction both chemical and mechanical. They are known to persist under conditions leading to complete destruction of bones and even of other teeth.

Finally, in the way of exception, among bones of bats from the Podlesice breccia, detached bones of weasels have been collected, though not yet specifically identified. This occurrence finds its analogy in recent cave faunas. Weasels, such as the marten *Martes martes* (Linnaeus) and the weasel *Mustela nivalis* Linnaeus in the Tatra Mountains venture into caves for a distance of several hundred meters from the cave entrance, where their bone remains are occasionally encountered. Similar facts have also been mentioned in a most interesting paper by H. Zapfe (1954).

Different origin is ascribed to animal remains represented by some fragments extremely rare in the Podlesice breccia, recovered from a thin layer showing dark colouration and with matrix consisting of crystalline calcite and an important admixture of clay elements. It has not been possible either to determine whether the Podlesice breccia contained only one or more of these layers, or to ascertain their stratigraphic position. The discovered layer has yielded numerous bat bones conspecific with others collected elsewhere in the breccia, but besides them we also encounter numerous bones of insectivore mammals and rodents, very rare bones of birds and finally a detached specimen of a lizard mandible (*Lacerta* sp.). The condition of preservation of the remains of small mammals. the absence of remains referable to larger forms and the dark colouration of the layer — due probably to organic matter — suggest that owls have caused their accumulation. Owls do, indeed, frequently seek day shelter in caves and the pellets, indigestible remnants of hair and bones of animals they have devoured and spat out, are always found in abundance directly beneath their places of shelter. Numerous finds of

mammalian remains of this origin, both from recent and later Pleistocene time, have been recorded and described, so that their composition and state of preservation are well known. The material derived from these food remnants spat out by owls is always strongly differentiated; it is referable to quite small animals only, with a predominance of skulls and mandibles over other skeletal bones; in the skulls the braincases have not been preserved. All these features agree with those of the Podlesice material.

Thus, both the lithology and faunal composition of the Podlesice breccia indicate that it is a fossilized cave deposit which had formed at considerable distance from the cave entrance.

AGE OF BRECCIA

The geology of the Podlesice breccia does not suggest any important clue as to its age. It is known that the breccia had undoubtedly formed within the cave, while its present site is in an open surface pit. Since the land relief of the Cracow-Wieluń Highlands is essentially referable to pre-Pleistocene times, while the pit containing the breccia occurs on the ridge of a lofty monadnock, it does not seem possible to ascribe the destruction of the roof in the cave to the action of water, at a time subsequent to the glaciation of this terrain. It is more probable that the ceiling of the cave suffered destruction and all its remains were removed by action of land-ice which had but once traversed the Podlesice area, namely during the Mindel glaciation period. This would assign a pre-Mindel age to the breccia.

Closer dating of the breccia is possible on its fauna which shows the following composition:

Insectivora

Talpa minor Freudenberg
Desmana nehringi Kormos
Sorex alpinoides n. sp.
S. dehneli n. sp.
S. cf. *praearaneus* Kormos
Sorex sp.
Petenyia hungarica Kormos
Soriculus kubinyi Kormos
Suncus cf. *pannonicus* (Kormos)

Chiroptera

Rhinolophus cf. *ferrumequinum* (Schreber)
Miniopterus schreibersi (Kuhl)
Plecotus crassidens Kormos
Myotis podlesicensis n. sp.
M. cf. *aemulus* Heller
M. dasycneme subtilis n. subsp.
M. danutae n. sp.
M. cf. *exilis* Heller

Rodentia

Mimomys cf. *pusillus* (Méhely)
Baranomys lóczyi Kormos
Parapodemus coronensis Schaub
Glis sackdillingensis minor n. subsp.

Out of the 20 small mammalian forms which have been specifically determined and are here described, two only seem indentifiable with recent species, still living, though not now encountered in Poland. The remaining forms are either completely new to science or have previously been recorded from early Pleistocene and Pliocene fossil faunas in Europe.

Of marked significance in determining the age of small mammalian Quaternary faunas are remains of the Microtinae subfamily. The Microtinae were then undergoing rapid evolution and yield good index fossils for even quite short geologic periods in Europe. In Podlesice this subfamily has but one representative belonging to genus *Mimomys* F. Major which made its appearance in Europe during the late Pliocene and finally disappeared during the Mindel glaciation period (A. Papp & E. Thenius, 1949). Besides *Mimomys*, other Microtinae genera with closed tooth roots, such as *Evotomys* Coues, *Dolomys* Nehring etc. are recorded by earlier finds from the older Pleistocene. Later, in the middle of the Günz-Mindel Interglacial, other Microtinae genera make their appearance, characterized by teeth with roots not closed and by persisting growth. These are: *Arvicola* Lacépède, *Pitymys* McMurtrie and *Microtus* Schrank, represented by other species than those now living. The fact that genus *Mimomys* is the sole representative in Podlesice of the Microtinae, and the absence there of forms belonging to genera of this group with more advanced specialization are indeed of some significance, even though greatest caution should always be exercised in the consideration of negative palaeontological data. Species *Mimomys pusillus* (Méhely), to which the Podlesice remains are most probably referable, has thus far been recorded from Püspökfürdö in Rumania (L. Méhely, 1914), from Villany Kalkberg in Hungary (T. Kormos, 1937*a*), from Lateiner Berg (Stranska Skala) near Brno in Czechoslovakia (F. Heller, 1936*a*), from Gaisloch (G. Brunner, 1950), from Sackdillinger Höhle (G. Brunner, 1934) and Gundersheim (F. Heller, 1936*a*) in Germany, from borings in several localities in Holland (A. Schreuder, 1933, 1936, 1943) and from Senèze in France (T. Kormos, 1931). All these sites have been assigned early Pleistocene age or defined as „Preglacial".

Baranomys lóczyi Kormos, an interesting rodent, has thus far been recorded from Csarnota in Hungary (T. Kormos, 1933*a*), from Gundersheim in Germany (F. Heller, 1936*a*) and from Wojcieszów in Poland (F. Heller, 1937).

Parapodemus coronensis Schaub is up to now known only from Brasso in Rumania (S. Schaub, 1938). Genus *Parapodemus* Schaub is represented by several species from the Pliocene deposits of Europe and Mongolia,

while species *P. coronensis* Schaub is the sole Pleistocene form of this genus. According to S. Schaub (1938) the Brasso specimen is referable to the Mindel glaciation period.

Glis sackdillingensis minor n. subsp. is a new form, but specimens of the typical form of *Glis sackdillingensis* Heller have been recovered from early Pleistocene fauna of the Sackdillinger Höhle in south Germany (F. Heller, 1930*a*, 1933; G. Brunner, 1934), later also from the Gaisloch cave (G. Brunner, 1950).

Talpa minor Freudenberg is known from a number of early Pleistocene sites in central Europe. It has been recorded from Püspökfürdö and Brasso in Rumania (T. Kormos, 1937*a*), from Beremend, Villany Kalkberg and Nagyharsanyberg in Hungary (T. Kormos, 1937a) from Gundersheim (F. Heller, 1936 a), Sackdillinger Höhle (F. Heller, 1933; G. Brunner, 1934) and Erpfinden (F. Heller, 1936*b*) in Germany, from Hundsheim in Austria (W. Freudenberg, 1914; T. Kormos, 1937*b*). This species is also mentioned in the fauna from Mauer (F. Heller, 1939), probably referable to a later period, i. e. the Mindel-Riss Interglaciation.

Desmana nehringi Kormos is known from Beremend and Villany Kalkberg in Hungary (T. Kormos, 1913, 1938). A form recorded from Gundersheim in Germany (F. Heller, 1936*a*) and ascribed to this species, is probably referable to *Desmana tegelensis* Schreuder (A. Schreuder, 1943).

Sorex alpinoides n. sp. is a species new to science, but it most closely approaches *Sorex praealpinus* Heller from Sackdillinger Höhle (F. Heller, 1930*a*, 1933) and from Gaisloch (G. Brunner, 1950), whereas *Sorex dehneli* n. sp. is a rather isolated species, on whose relationships only very little can be said.

Sorex praearaneus Kormos has been described from Villany Kalkberg in Hungary (T. Kormos, 1934) and has not been recorded from elsewhere.

Petenyia hungarica Kormos is recorded from Villany Kalkberg and Csarnota in Hungary (T. Kormos, 1934, 1937*a*), from Püspökfürdö in Rumania (T. Kormos, 1937*a*) and from Gundersheim in Germany (F. Heller. 1936*a*). *Petenyia suavensis* Pasa, very closely approaching it, has been described from northern Italy (A. Pasa, 1948).

Soriculus kubinyi Kormos has been described from Villany in Hungary and has not thus far been recorded from other sites. It belongs to a genus now extinct in Europe but still living in East Asia.

Suncus pannonicus Kormos has been described from Beremend in Hungary (T. Kormos, 1934) and has not since been recorded from other sites.

Rhinolophus ferrumequinum (Schreber) is noted from early Pleistocene sites in Wojcieszów, Poland (F. Heller, 1937), in Gundersheim, Germany (F. Heller, 1936*a*) and in Choukoutien, China (W. C. Pei, 1934). The present distribution of this species ranges over western, central and southern Europe, northern Africa, central and southern Asia and Australia. Though encountered in the vicinity of the southern boundaries of Poland it never occurs within Polish territory.

Miniopterus schreibersi (Kuhl) is recorded already from the early Pleistocene deposits of Püspökfürdö in Rumania (T. Kormos, 1937*a*), of Gundersheim (F. Heller, 1936*a*) and Moggaster Höhle (F. Heller, 1930*b*) in Germany and from Choukoutien in China (W. C. Pei, 1934). Its present range stretches over southern Europe, northern Africa, central and southern Asia and Austrialia. It has never been recorded from Poland but is known to occur in such close proximity as the Slovakian area of the Pieniny range.

Plecotus crassidens Kormos has hitherto been recorded from Püspökfürdö in Rumania only (T. Kormos, 1930*a*).

Of genus *Myotis* Kaup, in addition to species new to science and a new subspecies, we have here two forms, probably identical with those described from Gundersheim in Germany (F. Heller, 1936*a*), to say: *Myotis aemulus* Heller and *M. exilis* Heller.

Generally, one can see that it is almost exclusively fossil forms that are recovered from the Podlesice fauna. The two only species that have been identified with forms still living today, though over a somewhat modified range of distribution, belong to bats, commonly known for their conservatism and recorded from other early Pleistocene sites. Numerous mammalian remains noted in the Podlesice breccia have been previously recovered from fossiliferous deposits of Rumania, Hungary and Germany and are referred to as „Preglacial" or Pliocene. More recent studies, however, have disclosed that most of these faunal assemblages are referable to early Pleistocene times. A new attempt at determination of the geological age of the faunistical finds of that period was taken up by A. Papp & E. Thenius (1949) who based it mostly on an analysis of the presence in these finds of rodents from the subfamily of Microtinae. The faunas from Villany Kalkberg, Csarnota, Beremend, Gundersheim, Püspökfürdö and Sackdillinger Höhle have by these authors all been referred to the Günz-Mindel Interglacial. On the evidence of its distinct analogies with the fauna from the above mentioned sites it is thought justifiable to refer also the Podlesice fauna to the Günz-Mindel Interglacial, called Tegelien by W. Szafer (1953).

Far greater difficulties are encountered in establishing the location of the Podlesice fauna within the Tegelien Interglacial. On the absence of

Microtinae with open molar tooth roots, which make their appearance at the beginning of this interglaciation, it may be presumed that here, in the taphocoenosis of the Podlesice breccia, we are dealing with a fauna belonging to the initial stage of this interglaciation, though negative evidence of this type cannot be regarded as decisive.

ZOOGEOGRAPHIC AND PALAEOCLIMATIC PROBLEMS

Both, palaeozoological and palaeobotanical studies disclose that the Tegelien Interglacial (Günz-Mindel) was a period characterized by the extinction of a number of Tertiary, Pliocene forms. As shown by investigation of the flora from Mizerna in the sub-Carpathian area of Poland (W. Szafer, 1953), referable to that same Interglacial, one third of the plant remains collected at that site belongs to species now extinct; one half does not occur in Europe but is found in North America and Asia and the rest only have persisted in Europe until now. Thus, it is inferred that the oldest Pleistocene glaciation has not been the decisive factor, either in southern Europe or even in the warmer zones of central Europe for any essential faunal or floral changes. It should not, therefore, be surprising that it was formerly the common practice, particularly so in Hungary and Rumania, to refer faunal assemblages from the first interglaciation period to „pre- glaciation" and to assign them the Pliocene age. It was not until the second glaciation that havoc was wrought among forms then living in Europe.

Representatives are also found in the Podlesice breccia of archaic forms which were on the eve of extinction in that interglacial fauna. Among them is an interesting species of the Rodents, i. e. *Baranomys lóczyi* Kormos, whose nearest relatives are recorded from Pontian deposits of Mongolia (*Microtodon* Miller). The structure of its molars is strikingly like that of the cheek teeth of the Microtinae though it developed after a structural pattern typical of the dentition of hamsters. The extinction of genus *Baranomys* Kormos was probably brought about by the evolution of the Microtinae whose molars had at that time acquired the ability for persistent growth. In the course of later Pleistocene and Recent times this was the essential factor enabling the Microtinae to spread over all the continents of the globe and to thrive in unsurpassed numerical abundance.

Parapodemus coronensis Schaub is another archaic form yielded by the Podlesice breccia. It belongs to an extinct genus *Parapodemus* Schaub which is represented in the Pleistocene deposits by this single form, hitherto recorded from two sites only. *Desmana nehringi* Kormos is a further archaic form here. Of the numerous and well differentiated

Pliocene and later Pleistocene species from subfamily Desmaninae but two are now living, i. e. *Galemys pyrenaicus* (Geoffroy) in the Iberian Peninsula and *Desmana moschata* (Linnaeus) in the southern zones of European Russia.

Plecotus crassidens Kormos, a bat from the Podlesice fauna, represents probably a faunal analogy with the numerous species from the flora of the Tegelien Interglacial, now extinct in Europe, but still persisting in North America. It is probable that this species placed within genus *Plecotus* Geoffroy in reality more closely approaches the North American genus *Corynorhinus* Allen. We may suppose that further research work which ought by all means give more attention to analoguous American material, will not fail to discover additional comparable early Pleistocene forms still living in America, as has been the case in respect to the flora of that period.

On evidence of the above description of Podlesice species, recorded from other European sites of the same period, the Podlesice fauna is shown closely allied to faunas from central Europe, Hungary, Rumania and southern Germany. On the other hand, one is struck by the complete absence of species occurring in the Cromer Forest Beds of Great Britain. which also used to be assigned to this period (F. Zeuner, 1954, p. 260). Perhaps, as suggested by H. Gams (1952), the Cromer Forest Beds are actually of a younger age, or we may here have a geographical differentiation of faunas.

What was the climatic background of the taphocoenosis of the Podlesice breccia? As stated above, this taphocoenosis is composed of two tanatocoenoses: the relicts of the winter colony of bats and the pellets of owls seeking shelter in the cave.

The specific composition of the bat colony does not supply any important clue with regard to climate: forms identical with recent species. such as *Rhinolophus ferrumequinum* (Schreber) and *Miniopterus schreibersi* (Kuhl) and those congeneric with the extinct forms *Myotis* Kaup and *Plecotus* Geoffroy as well, today range from the tropics to zones with moderate climate. But the mere fact of the existence of a winter colony of bats indicates the occurrence in those times of a distinctly chilly season. The presence of *Rhinolophus ferrumequinum* (Schreber) and *Miniopterus schreibersi* (Kuhl) suggests, however, that the climate at the time of the formation of the breccia was somewhat warmer than that now prevailing in the Podlesice area.

The other tanatocoenosis of the Podlesice breccia, which is due to the owl pellets, is entirely made up of extinct species only. We can make but indirect inferences as to the climatic needs of these forms. All the species here present belong to forest animals. The sylvian genus *Glis*

Brisson bears special testimony to the existence there of forest environment. On the other hand, the absence is noted of such typically steppe forms as *Spalax* Gueldenstaedt, known from other sites of this period. It may therefore be inferred that at the time of formation of the Podlesice breccia the vegetation of the Cracow-Wieluń Highland was sylvian, while the climate was moderate, somewhat warmer than that of recent time. This agrees with W. Szafer's (1952) studies on the Mizerna flora from the same interglacial. Forests with a number of Pliocene forms predominate in the flora of the second successive stage of the interglacial deposits. It is the later period of the interglacial that brings about a cooling down of the climate which eliminates xerothermic species and leads to the predominance of many species of trees up to now existing in Europe.

SYSTEMATIC DESCRIPTIONS

Insectivora Bowdich, 1821

Family **Talpidae** Gray, 1825

Subfamily **Talpinae** Murray, 1866

Genus *Talpa* Linnaeus, 1758

Talpa minor Freudenberg, 1914

(pl. I, fig. 1)

1914. *Talpa europaea* var. *minor* n. subsp.; W. Freudenberg, Die Säugetiere..., p. 209, pl. 19, fig. 7, 32, 33, 35-37.
1930. *Talpa gracilis* n. sp.; T. Kormos, Diagnosen..., p. 239.
1930. *Talpa europaea* L. (partim); F. Heller, Eine Forest-Bed Fauna..., p. 253.
1933. *Talpa gracilis* Kormos; F. Heller, Ein Nachtrag..., p. 60-61, fig. 1, 2.
1934. *Talpa gracilis* Kormos; G. Brunner, Eine präglaziale Fauna..., p. 308.
1936. *Talpa gracilis* Kormos; F. Heller, Eine oberpliozäne Wirbeltierfauna..., p. 105.
1936. *Talpa gracilis* Kormos; F. Heller, Eine Forest-Bed Fauna..., p. 5.
1937. *Talpa gracilis* Kormos; T. Kormos, Revision..., p. 26-27, fig. 1a.
1938. *Talpa europaea* var. *minor* Freudenberg; M. Kretzoi, Die Raubtiere..., p. 91.
1939. *Talpa gracilis* Kormos; F. Heller, Kleinsäugerreste..., p. 10, fig. 4.

Material. — A damaged mandible with M_2 and M_3, the posterior part of the mandible showing complete processes, but toothless; 5 humeri, one scapula.

Description. — The ramus of the mandible slight and delicate. Coronoid process narrowing towards the end, with end somewhat curved backwards. Anterior edge of processus coronoideus forms an obtuse angle with the mandibular ramus, whereas in *Talpa europaea* Linnaeus it is a right angle. The posterior mental foramen is situated beneath the posterior root of M_1. Both preserved molars show no difference from the teeth of *T. europaea* Linnaeus.

The shoulder blade has a construction characteristic of genus *Talpa* Linnaeus, with a tubercular acromion and margo superior rimmed by a thickening of the bone. Neither does the construction of the humerus show any difference from that of *T. europaea* Linnaeus.

Dimensions (in mm): height of mandibular ramus between M_1 and M_2 1.7, thickness of same 1.0 and 1.0; length of M_2 1.7; length of M_3 1.5; length of shoulder blade 17.6, minimum breadth of same 1.1. The following are the dimensions of four complete humeri: length 10.9, 10.8, 11.0, 11.0; breadth 3.5, 3.2, 3.2, 3.4.

Systematic position. — The size of the fossil specimens together with the characteristic structure of coronoid process refer them to *Talpa minor* Freudenberg, the smallest of the early Pleistocene moles.

In 1916 „*Talpa europaea* var. *minor* n. subsp.", a new mole subspecies was described by Freudenberg from the lower Pleistocene deposits of Hundsheim in Austria. Its description, as given by that author, is very inadequate, while of the drawings said to represent its remains, a part only refer to this species, the remainder being referable to *Talpa fossilis* Petenyi and *Beremendia fissidens* (Petenyi). In 1930, the same form was by T. Kormos named *Talpa gracilis*. Later on it was recorded from many early Pleistocene sites in central Europe. In 1938, M. Kretzoi states that *T. europaea minor* Freudenberg and *T. gracilis* Kormos are synonymous. Owing to considerable differences of size and structure, *T. minor* Freudenberg is to be specifically separated from *T. europaea* Linnaeus.

Subfamily **Desmaninae** Thomas, 1912

Genus *Desmana* Guldenstadt, 1777

Desmana nehringi Kormos, 1913

(pl. I, fig. 2, 3)

1913. *Desmana* (?) *Nehringi* n. sp.; T. Kormos, Trois nouvelles espèces..., p. 138, pl. 6. fig. 1a–f.

1938. *Desmana Nehringi* Kormos; T. Kormos, Zur näheren Kenntnis..., p. 164, fig. 1-4.

1940. *Desmana nehringi* Kormos; A. Schreuder, A revision..., p. 313, fig. 4, 32b, 35, 41, 50, 62, 67, 80; pl. 8 fig. 3, pl. 9 fig. 7-11, pl. 10 fig. 8, 11-13, pl. 11 fig. 3, 4, 14, 19, 23.

Material. — Fragments of cranial calotte, 2 fragments of maxilla: one with M^2, the other with P^4 and M^1, fragment of mandible with P^2 and P_4-M_2 two detached I^1. All these specimens were found together and belong to the same individual with teeth only slightly worn. The notation of teeth is after the pattern given in a paper by A. Schreuder (1940).

Description. — Bridge over the infraorbital canal narrow, obliquely placed but somewhat less inclined than in the recent *Desmana moschata* (Linnaeus). Its lower end placed between M^1 and M^2.

Both specimens of I^1 are badly damaged. They are large, strongly flattened, with a triangular section. P^2 is with three roots, its cingulum is well developed. In P^4 the protocone shows strong development, the deuterocone is also of considerable dimensions, it infills the inner convexity of the crown. The tritocone is low, poorly isolated, joint to the protocone by a sharp ridge. Cingulum well developed, it forms a well marked hump on the front wall of the tooth but is also quite clearly indicated on the back wall. The anterior margin of the protocone is conical without the sharp ridge characteristic of genus *Galemys* Kaup. M^1 badly damaged. Its metacone joint to the metastyle by a robust sharp ridge. The posterior mezostyle, joint to the metacone by a short ridge curving to the front, is less strongly developed than the anterior mezostyle. Cingulum on the anterior margin of the tooth well developed, the parastyle forms a distinct isolated notch.

The lower mandibular margin is nearly horizontal. A slight downward curve at the lower margin of the mandible beneath the posterior margin of P_2 indicates the beginning of the symphysial swelling. A large mental foramen is below the anterior root of M_1, the margin of the second mental foramen has been preserved below the anterior root of P_2.

In P_2 the cingulum is well developed, somewhat less so on the frontal part of the tooth, and forming a small notch at the back. In the anterior margin the paraconid is not distinguishable as it is completely fused with the ridge descending the protoconid towards the front. P_3 is broken off, roots only have been preserved. They are flattened, closely arranged, the posterior root protruding from the tooth row and pushed outwards. This indicates that P_3 was placed obliquely and partly external to the tooth row. P_4 is relatively large. Its paraconid is rather poorly developed. Of the cusps in the posterior tooth margin the endoconid is the strongest, the others being poorly developed. The cingulum is developed all round the crown. The molars are somewhat damaged. Their cingulum is well developed. The endoconids are broad, separated from the metaconids by deep grooves. All the teeth have a yellowish colouration.

Dimensions (in mm): thickness of the bone bridge over the infraorbital canal 0.75; larger diameter in I^1 at the base of the crown is (in both specimens) 3.0, smaller diameter of same 1.2; length of P^2 2.25, breadth of P^2 1.5, height of P^2 2.0; outer length of P^4 2.75, posterior margin breadth of P^4 2.25; outer length of M^1 3.5, anterior breadth of M^1 about

2,7; inner height of the mandibular ramus behind P^2 4.0, thickness of same 2.0; height of the mandibular ramus behind P^4 (from the inner side) 4.0. thickness of the mandibular ramus behind P^4 2.0; height of the mandibular ramus behind M_1 (from the inner side) 4.1, thickness of the mandibular ramus behind M_1 2.1; length of P_2 2.0, breadth of P_2 1.25, height of P_2 1.8; length of P_4 2.25, breadth of P_4 1.25, height of P_4 2.0; length of M_1 3.0, breadth of M_1 (measured at the protoconid) 1.8, breadth of M_1 (measured at the hypoconid) 2.2; length of M_2 2.8, breadth of M_2 1.8.

Systematic position. — The assignment of the fossil remains to genus *Desmana* Guldenstadt is based on the characteristic structure of the molars, of the bone bridge over the infraorbital foramen as well as on a number of other characters. A related genus, the *Galemys* Kaup, now occurring in the Pyrenees, is distinguished by the lack of cingulum in the lower molars, a broad bone bridge over the infraorbital foramen and a sharp ridge in P^4.

Genus *Desmana* Guldenstadt is represented by a single recent species the *Desmana moschata* (Linnaeus), encountered within the southern territories of European Russia, also by a number of extinct species, one of which is Pontian and several others Pleistocene. The fossil specimens found at Podlesice are distinguished by small dimensions, which bar them from being referred to forms assigned to species *Desmana moschata* (Linnaeus) and *D. thermalis* Kormos. The question is therefore open as to their identity with one of the small sized species recorded from the early Pleistocene, namely: *Desmana nehringi* Kormos, *D. kormosi* Schreuder, *D. tegelensis* Schreuder and „*Galemys*” *semseyi* Kormos. This latter species, which is only very superficially known, may possibly also belong to genus *Desmana* Guldenstadt. The fossil remains of „*Galemys*” *semseyi* Kormos differ, however, from the Podlesice specimen by smaller dimensions and the complete absence of cingulum on the lower molars.

Desmana kormosi Schreuder and *D. tegelensis* Schreuder, two closely related forms, differ by smaller dimensions from the Podlesice specimens. In both these forms there is no dislocation of P_3, which is very distinct in our material. Finally, *D. kormosi* Schreuder is differentiated by a characteristic shortening of P^4 which is not to be noted in the Podlesice specimen.

On the other hand, the Podlesice remains very closely agree with the description, dimensions and sketches of genus *Desmana nehringi* Kormos. Their dimensions are identical, both also show a characteristic projection of P_3 from the mandibular tooth row and a strongly developed cingulum in the lower molars.

Family **Soricidae** Gray, 1821

Subfamily **Soricinae** Murray, 1866

Genus *Sorex* Linnaeus, 1758

Sorex alpinoides n. sp.

(pl. I, fig. 7, 8; text-fig. 1d)

Holotype. — Anterior part of skull with P^4 and M^1-M^3, also both mandibular rami with complete dentition, P_1 excepted.

Stratum typicum. — Günz-Mindel Interglacial.

Locus typicus. — Podlesice near Kroczyce, Olkusz district.

Derivatio nominis. — *alpinoides*-close to *Sorex alpinus* Schinz.

Material. — Besides the type specimen, 6 imperfect skulls and 15 complete or damaged halves of mandibulae, also fragments of skulls and mandibles. All the teeth, with the exception of I^1, are represented in the material available to the author.

Description. — The rostrum is shortened. The infraorbital foramen is small, with a round contour (not oval and elongate as it is in *Sorex araneus* Linnaeus). Lacrymal foramen is placed above the point where M^1 and M^2 meet (notation of teeth after M. Friant, 1949).

There are 5 unicuspids beyond the first incisor. I^1 has not been preserved. I^2 and I^3 are rather large. P^1 is considerably smaller than the incisors, never attaining half their length. P^2 is half the size of P^1.

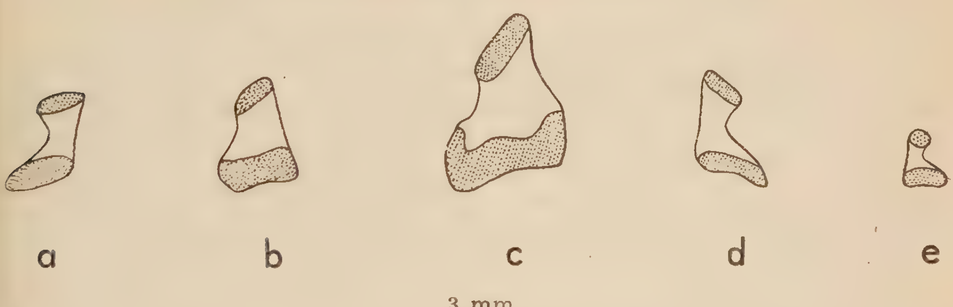

Fig. 1. — Surface of articular processes of mandible *(processus articularis)*; *a Sorex* cf. *praearaneus* Kormos, *b Petenyia hungarica* Kormos, *c Sorex dehneli* n. sp., *d Sorex alpinoides* n. sp., *e Suncus* cf. *pannonicus* (Kormos).

it is broader than long, being squeezed in between P^1 and P^4 and thus compressed. P^3 is completely pushed out of the maxillary tooth-row and almost entirely hidden under the crown of P^4. The posterior margin of P^4, M^1 and M^2 is medially rather strongly curved to the front, so much so as to leave a free space between this latter margin and the anterior margin of the next tooth. M^3 is not more reduced than *Sorex araneus* Linnaeus.

The mandible is short, the mandibular ramus fairly high. The coronoid process slender, narrow, somewhat curving to the front. Its anterior margin reaches the mandibular ramus at an obtuse angle. The articular process shows a most characteristic shape of the joint surface, the lower joint surface is fairly narrow, in the centre ventrally arcuately emarginated, pointing to the lingual end. The upper joint surface is strongly oblique, fairly short. The bone bridge uniting these two joint surfaces is narrow, elongated, almost linear on the labial side, on the lingual side strongly arching inwards. The angular process is long, narrow, not curving.

The mental foramen is placed below the mid-length of P_4. The teeth either show very pale pigmentation or are altogether without it.

The first lower incisor is short, besides the terminal cusp it shows, as a rule, only two low cusps separated by shallow valleys. Occasionally, a third cusp is very poorly marked. P_1 is elongated, distinctly two-cusped in specimens with little worn teeth. P_4 also shows two distinct cusps. M_3 has 5 tubercles without signs of reduction.

Dimensions (in mm):

Skulls	*type*	*1*	*2*	*3*	*4*	*5*
interorbital constriction	—	—	3.4	—		
molars	4.7	5.0	4.6	4.7	4.7	—
length from P^4 to M^3	4.0	3.75	3,9	4.0	4.0	4.0
length of tooth-row (alveolar) without I^2	5.1	4.9	5.0	5.1	5.1	5.1

Mandibles	*type*	*6*	*7*	*8*	*9*	*10*
mandibular length	6.9	7.0	7.5	7.2	7.5	7.0
length of tooth-row with I_2	5.8	5.6	5.7	5.9	5.6	5.7
same without I_2	4.1	4.1	4.1	—	—	4.3
length from M_1 to M_3	3.3	3.2	3.2	3.1	3.2	3.2
height of mandibular ramus below M_2 from the inside	1.2	1.1	1.1	1.2	1.2	1.2

Mandibles (continued)	*11*	*12*	*13*	*14*	*15*	*16*	*17*
mandibular length	6.7	7.4	—	—	7.0	7.0	—
length of tooth-row with I_2	5.4	5.7	—	—	—	—	5.6
same without I_2	—	—	—	—	—	4.2	—
length from M_1 to M_3	3.0	3.2	3.2	3.2	—	3.3	3.2
height of mandibular ramus below M_2 from the inside	0.9	1.1	1.2	1.2	1.1	1.1	1.2

Systematic position. — The assignment of the here described form to genus *Sorex* Linnaeus is beyond doubt since it has 5 maxillar unicuspids, pigmented points of the teeth and the area connecting the two facets of the articular process without marked narrowing. Within genus *Sorex* Linnaeus it is *S. alpinus* Schinz, which comes closest to *S. alpinoides* n. sp. Their common characters are: indistinct lobes on first mandibular incisor, two-cusped P_1, position of the lacrymal foramen at the junction of M^1 and M^2, and a narrowing of the area between two facets of the articular process. By these characters *Sorex alpinus* Schinz differs from all other fossil and recent species of genus *Sorex* Linnaeus, species *S. praealpinus* Heller excepted. From *S. alpinus* Schinz, however, *S. alpinoides* n. sp. differs by considerably smaller dimensions, distinct shortening of the rostral part of the skull and by shape of the articular process. The other species of the *S. alpinus* Schinz group, namely *S. praealpinus* Heller, described by F. Heller (1930*a*) from the early Pleistocene of Sackdillinger Höhle in Germany, is known on its mandible only. This mandible is of considerably larger dimensions than that of *S. alpinoides* n. sp., moreover there also exist differences of proportions, the height of the mandibular ramus being similar in both forms, but in *S. alpinoides* n. sp. we note a strong shortening of the mandible, particularly so in its anterior portion, correlating with the above mentioned shortening of the rostral part of the skull. There are also some differences in the shape of the articular process.

The cardinal features which make *S. alpinoides* n. sp. differ from all its related forms and lead to its establishment into a separate species of the *S. alpinus* Schinz group are as follows: small dimensions (mandibular length is from 10.0 do 11.0 mm in *S. alpinus* Schinz, from 9.2 to 9.3 mm in *S. praealpinus* Heller, and from 6.7 to 7.5 mm in *S. alpinoides* n. sp.), exceptionally shortened rostral part of the skull, and the form of the articular process which is distinguished by a more conspicuous narrowing of the area between the two facets than in other species of *Sorex* Linnaeus.

Sorex dehneli n. sp.

(pl. I, fig. 5, 6; text-fig. 1c)

Holotype. — Fragment of the mandible with complete dentition, without processes.

Stratum typicum. — Günz-Mindel Interglacial.

Locus typicus. — Podlesice near Kroczyce, Olkusz district.

Derivatio nominis.— *dehneli*- in honour of Prof. dr August Dehnel, an outstanding Polish scientist known for his research works on the family Soricidae.

Material. — 15 fragments of the mandible, 3 detached upper molars (P^4, M^1, M^2). The preserved fragments of mandible represent the complete dentition and processes.

Description. — P^4, M^1, M^2, the only preserved upper teeth, are developed in a manner similar to those of *Sorex araneus* Linnaeus. They also show similarly embayed posterior coronal margin.

The mandibular ramus is robust but low. Anterior margin of coronoid process united with mandibular ramus at an obtuse angle. The upper end of the coronoid process is narrow, somewhat curved backwards. The fossa pterygoidea is deep, low, rounded at top. Its lower margin is strongly inflated. The articular process shows two facets, of which the lower one is broad, short, blunt at the lingual end. The upper facet is short, markedly obliquely placed. The area uniting them is broad, somewhat arching inwards on the lingual side. The angular process is thin, directed slightly downwards, not very long. The mental foramen is set below P_4, at two thirds of its length counting from the front.

Apically the teeth are strongly pigmented to a dark-brown colour with orange tints. The lower incisor has three lobes besides the terminal, they are, however, very poorly marked. As a rule, only two lobes are distinguishable in addition to the terminal one, the third lobe being either very slight or completely lacking. P_1 and P_4 are robust, the former having but one cusp, the latter two cusps. A strong cingulum is developed round the molars. The third molar shows 5 tubercles.

Dimensions (in mm):

Mandibles	*type*	*1*	*2*	*3*	*4*	*5*
length of tooth-row with I_2	8.4	7.9	—	—	—	—
same without I_2	6.1	5.3	—		–	
length of M_1-M_3	4.6	4.4	4.5	4.5	4.4	4.5
height of mandibular ramus below M_2	1.9	1.6	1.9	1.7	1.7	1.8

Systematic position. — The lack of the posterior maxillary teeth greatly hinders the determination of the systematic position of this new species. The apical pigmentation of teeth, the presence of 5 tubercles on the coronal surface of M_3, the form of the articular process and finally the presence of three lobes (though very indistinct) on the margin of the lower incisor — justify their sure assignment to genus *Sorex* Linnaeus. The size itself of the remains found in Podlesice bars them from being referred to any recent or most of the extinct species within this genus. The only forms approaching our form are those of *Sorex savinii* Hinton from the early Pleistocene deposits of Great Britain, *S. margaritodon* Kormos from the „Preglacial" of Hungary and *S. tasnadii* Kretzoi from Gombasek in Czechoslovakia. *S. dehneli* n. sp. differs considerably from

S. savinii Hinton. While in the British species the posterior margin of the coronoid process meets the mandibular ramus at a right angle, in *S. dehneli* n. sp. it is an obtuse angle. In *S. dehneli* n. sp. the fossa pterygoidea is low and rounded at top, while in *S. savinii* Hinton it is high. The form of the surface of the articular process is also quite different and the mental foramen in the British species is placed further back. Finally, the dimensions of the Podlesice specimens are larger.

The description of the mandible of *Sorex margaritodon* Kormos in papers by T. Kosmos (1930*a*, 1935) is inexact and not figured. I had, however, the opportunity of comparing my specimens with those collected by T. Kormos in Püspökfürdö, now deposited in the palaeontological collections of the Geological Institute at Budapest. The dimensions of the species from Hungary are somewhat smaller than those of *S. dehneli* n. sp., i. e. in *S. margaritodon* Kormos the M_1-M_3 length is from 3.9 to 4.3 mm. an average of 4.0 mm, while in *S. dehneli* n. sp. it is from 4.4 to 4.65 mm, an average of 4.5 mm. The length of the mandibular tooth-row without the incisor is from 5.6 to 6.0 mm in *S. margaritodon* Kormos while in the only available specimen of *S. dehneli* n. sp. the length of the complete tooth-row is 6.1 mm. In *S. margaritodon* Kormos the mental foramen is set below the posterior margin of the P_4 crown, while in *S. dehneli* n. sp. it is at two thirds of its length. In *S. margaritodon* Kormos the upper facet of the articular process is either parallel to the margin of the lower facet of that process, or weakly inclined, while in *S. dehneli* n. sp. it is strongly oblique. Finally, fossa pterygoidea, which both in *S. margaritodon* Kormos and in *S. savinii* Hinton is triangular and gradually passes into a canal stretching almost to the apex of the coronoid process, in the *S. dehneli* n. sp. is lower, rounding upwards.

Sorex tasnadii Kretzoi has been described very inexactly and without dimensions, M. Kretzoi (1941) only states that it is of the size of *S. savinii* Hinton. Its diagnostic character is said to be the presence of distinct lobes on I_2 in which it differs from *S. dehneli* n. sp.

S. dehneli n. sp. occupies an isolated position among the Quaternary species of genus *Sorex* Linnaeus. In size it exceeds all hitherto known species and is also differentiated by the form of its fossa pterygoidea and the oblique position of the posterior margin of the coronoid process.

These latter characters together with its large dimensions bring it somewhat closer to the extinct genus *Beremendia* Kormos. In the early Pleistocene deposits of Europe this form is represented by one species, the *Beremendia fissidens* (Petenyi), recorded from Hungary, Rumania, Germany and Italy, recently also discovered by the present author in the caves of Kadzielnia Quarry near Kielce, Poland. From *B. fissidens* (Petenyi), however, *S. dehneli* n. sp. differs by its smaller dimensions, the

presence of a fifth cusp on M_3 and by numerous structural details of the mandible. It is some future discovery of a complete skull of *Sorex dehneli* n. sp., that will lead to the sure determination of its systematic position.

Sorex cf. *praearaneus* Kormos, 1934

(pl. I, fig. 4; text-fig. 1a)

Material. — 4 incomplete mandibles or mandibular fragments representing the complete dentition.

Description. — The mandibular ramus similar to that in *S. araneus* Linnaeus. The coronoid process meets the mandibular ramus at the same angle as in this species, but its terminal portion is narrower. The fossa pterygoidea is large, rounding upwards and passing into a shallow canal reaching the joint portion of the coronoid process. The articular process shows a fairly large lower facet, weakly pointed lingually, medially somewhat indented. The upper facet is virtually parallel to the lower, short and rather broad. The area uniting them is slightly emarginated and broad. The angular process is long, slender, at the end curving upwards. The mental foramen is set between P_4 and M_1.

The teeth show pale pigmentation. I_2 has three distinct lobes in addition to the terminal lobe. P_1 has one cusp, P_4 two cusps. In M_3 the talonid is well developed, with two tubercles.

Dimensions. In the most complete fragment of mandible the mandibular length is 9.5 mm, length of tooth-row without the incisor 5.25 mm, length of M_1-M_3 3.6 mm, height of mandible on the inner side under M_2 1.4 mm.

Systematic position. — The remains preserved in Podlesice come very near to *Sorex araneus* Linnaeus which they also resemble in respect to size. With respect to the coronoid process it is not so, it being narrower in the case of the Podlesice specimens than that in recent form. The position of the mental foramen is also different, in *S. araneus* Linnaeus it is placed at midpoint of M_1, while in the fossil specimens it is between P_4 and M_1.

Of the early Pleistocene European fossil forms belonging to genus *Sorex* Linnaeus, the following also come near *S. araneus* Linnaeus: *S. praearaneus* Kormos, *S. araneoides* Heller and *S. pachyodon* Pasa. *S. araneoides* Heller, recorded from the Sackdillinger Höhle and from Erpfingen in Germany (F. Heller, 1930*a*, 1936*b*), differs from the Podlesice specimens by somewhat smaller dimensions (length of mandibular ramus being 8.9 mm, height 1.2 mm), while the M_1-M_3 length is markedly greater, being 3.75 mm. This form also shows a slightly different shape of the articular process. *S. pachyodon* Pasa from northern Italy has not

been described with much exactitude since no comparisons were drawn with other living or extinct species. Its dimensions agree with those of our form but the shape of the articular process seems to differ considerably. Finally, *S. praearaneus* Kormos from the „Preglacial" of Hungary comes closest to the here considered fossil remains. Regretfully, the drawing given by T. Kormos (1934) represents the skull only, without the mandible, though it is accompanied by a detailed description of the differences found between the skull of his form and that of *S. araneus* Linnaeus. In any case, the description of the mandible leads to the conclusion that the position of the mental foramen in the Podlesice specimens agrees with that in *S. praearaneus* Kormos, also that their fossa pterygoidea terminates lower down than in *S. araneus* Linnaeus. The dimensions of the Hungarian and the Podlesice species fully agree too. Yet a sure identification cannot be determined until the fossil remains here considered have been compared with specimens of all other fossil species from the *S. araneus* Linnaeus group. The holotype of *S. praearaneus* Kormos is wanting in the collection at the Zoological Department of the National Museum in Budapest, where most of the types of species described by T. Kormos are deposited. M. Kretzoi (personal communication) believes this species to be identical with *S. runtonensis* Hinton.

Sorex sp.

(pl. II, fig. 1)

Material. — Fragment of mandible without processes, with a broken I_2 and perfect P_2, P_4, M_1 and M_2.

Description. — Mandibular ramus very slight and thin. The mental foramen set between P_4 and M_1.

Tooth points pigmented to a pale yellowish tint. The found specimen of I_2 has its end broken off. There are three clearly shown lobes on the preserved portion. P_1 is elongated, probably two-cusped, one of the two cusps being very poorly marked. P_1 is distinctly two-cusped. M_1-M_3 have a well developed cingulum.

Dimensions. The height of mandible below M_2 is 0.77 mm, the thickness at this point being 0.5 mm. Length of tooth-row without I_2 is about 3.8 mm.

Systematic position. — The presence of 3 lobes on the margin of the upper incisor refers the preserved specimen to genus *Sorex* Linnaeus. The lack of mandibular proceses and of a complete tooth row is in the way of a closer determination of its systematic position. In what size is concerned the found mandible approaches the mandible of *S. minutissima* Heim de Balsac, recorded from the late Pleistocene of France

(H. Heim de Balsac, 1940). The Podlesice remains, however, differ from the French form by the position of the mental foramen. P_1, so characteristically elongated in the Podlesice form, cannot be compared with that of the French form, since it is lacking in the only specimen of mandible belonging to *S. minutissimus* Heim de Balsac, which has hitherto been discovered.

Genus *Petenyia* Kormos, 1934

Petenyia hungarica Kormos, 1934

(pl. I, fig. 9, 10; text-fig. 1b)

1930. *Petenyia hungarica* n. gen. & n. sp.; T. Kormos, Beiträge..., p. 57 (nomen nudum).
1934. *Petenyia hungarica* n. gen. & n. sp.; T. Kormos, Neue Insectenfresser..., p. 301-303, fig. 34, 35.
1936. *Petenyia hungarica* Kormos; F. Heller, Eine oberpliocäne Wirbeltierfauna..., p. 108-109, pl. 7, fig. 3, 4.
1949. *Petenyia hungarica* Kormos; M. Friant, Les Musaraignes..., p. 254, fig. 16.

Material. — 3 fragments of mandible, one with almost perfect processes and M_1-M_3, the second with processes and dentition badly damaged, the third with M_1-M_3.

Description. — The anterior margin of the coronoid process meets the mandibular ramus at a highly obtuse angle, the upper portion of the process, however, is somewhat curved upwards. The upper surface of the coronoid process is parted by a groove separating the cardinal area of the joint surface from its widened out portion pointing backwards. The fossa pterygoidea is triangular, low, elongating upwards into a shallow, poorly distinct canal. The two facets of the articular process are united by a broad area. The upper facet is placed markedly obliquely in relation to the lower one. Of the angular process only the basal part, relatively broad, is preserved. The mandibular ramus shows a slightly convex lower margin, it is robust and massive. In the only perfect mandibular ramus two mental foramina occur, one below the paraconid, the other one below the protoconid of M_1.

Points of teeth are pigmented to a dark-brown colour. The terminal part of I_2 is curved inwards. In addition to the terminal lobe there are also two other low lobes on the incisor. I_1 is short, with one cusp. P_4 bears one distinct cusp, beyond it an indistinct weakly marked elevation is visible on the cutting surface. Most characteristic is the structure of M_3 with 4 cusps only, since the metaconid is altogether wanting. The posterior portion of this tooth is very narrow, in form distinctly different from genera *Sorex* Linnaeus and *Neomys* Kaup.

Dimensions (in mm):

Mandibles	*1*	*2*	*3*
length of mandibular tooth-row with I_2	—	8.4	
same without I_2	—	5.0	—
length of M_1-M_3	3.6	3.6	3.9
height of mandibular ramus on the inner side below M_2	1.4	1.6	1.6

Systematic position. — Within the subfamily of Soricinae, characterised by pigmentation of tooth points, *Petenyia* Kormos and *Beremendia* Kormos only, two extinct genera, have M_3 with four tubercles. This brings them nearer to representatives of the subfamily Crocidurinae, whose teeth, however, lack pigmentation. Genus *Beremendia* Kormos contains but one species, the *B. fissidens* (Petenyi) with very large dimensions. The preserved fragments of mandibles from Podlesice, distinguished by strong pigmentation of teeth, M_3 with four tubercles, and small size, are referable to genus *Petenyia* Kormos. This genus was established in 1934 by T. Kormos for the species *Petenyia hungarica* Kormos recorded from the „Preglacial" of Hungary. In 1936, F. Heller also recorded this species from Gundersheim in Germany (F. Heller, 1936 *a*). In 1943 M. Kretzoi described two new species of this genus, *P. neglecta* Kretzoi and *P. stehlini* Kretzoi. These descriptions lack completeness, the differences given are so slight and little pronounced, that the names may probably be considered synonymous. Finally, in 1948, A. Pasa described *P. suavensis* Pasa, a new species of this genus from early Pleistocene deposits of north Italy. This latter species differs from *P. hungarica* Kormos by its somewhat smaller dimensions.

The dimensions of the Podlesice specimens approach those of *P. hungarica* Kormos. Assignment to that species is also suggested by the characteristic structure of the coronoid and articular processes. Height of mandible of *P. hungarica* Kormos has without doubt been erroneously stated by that author to be 2.3-2.5 mm. These figures should probably read 1.3-1.5 mm and would thus agree with the dimensions in the drawing. The Podlesice specimens seem to be somewhat larger than those from Hungary.

Genus *Soriculus* Blyth, 1855

Soriculus kubinyi Kormos, 1934

(pl. II, fig. 3)

1934. *Soriculus kubinyi* n. sp.; T. Kormos, Neue Insectenfresser..., p. 303-304, fig. 36.
1938. *Soriculus kubinyi* Kormos; M. Friant, Les Musaraignes..., p. 246-247. fig. 12.

Material. — 3 fragments of mandibles without processes, two with complete tooth-row.

Description. — The mental foramen is set at mid-length of M_1. The teeth are large, their points pigmented to a pale orange-brown hue. The second lower incisor has one flat lobe besides the terminal one. This tooth is relatively short. P_1 is elongated, indistinctly two-cuspidate. P_4 is with two cusps. M_3 has five tubercles. The cingulum round the molars is well developed.

Dimensions (in mm):

Mandibles	*1*	*2*
length of mandibular tooth-row with I_2	6.3	6.4
same without I_2	4.65	4.8
length of M_1-M_3	3.55	3.6
height of mandibular ramus on the inner side below M_2	0.7	—

Systematic position. — Pigmentation of teeth suggests the assignment of the found remains to subfamily Soricinae, while the presence of five tubercles on M_3 and the simple structure of the I_2 make them referable either to genus *Neomys* Kaup or *Soriculus* Blyth. The essential differences between these two genera consist in the number of upper teeth, while their identification on fragments of mandible meets with some difficulties. An exceptionally short I_2 is, however, suggestive of genus *Soriculus* Blyth which is represented in the early Pleistocene deposits of Europe by *Sorex kubinyi* Kormos of Hungary. A comparison of the Podlesice specimens with the holotype and other early Pleistocene specimens from Hungary shows them to be conspecific. T. Kormos (1934) states the length of the tooth-row with the incisor as from 6.6 to 6.7 mm, our specimens are therefore somewhat smaller.

Subfamily **Crocidurinae** Milne Edwards, 1868-1874

Suncus cf. *pannonicus* (Kormos, 1934)

Genus *Suncus* Ehrenberg, 1832

Suncus cf. *pannonicus* (Kormos, 1934)

(pl. II, fig. 2; text-fig. 1e)

Material. — Mandibular ramus with almost perfect processes, with damaged I_2 and complete P_4-M_3; also fragment of mandible with perfect processes and M_1 preserved.

Description. — The mandible slight but with rather massive ramus. The coronoid process meets the mandibular ramus at a slightly obtuse angle. Its terminal portion is narrow, pointed, gently inclined to the front. The fossa pterygoidea is deep, rounded at top, elongating upwards into a shallow canal. The lower facet of the articular process is strongly convex, elongated, obliquely placed, pointed on the lingual side. The upper

facet is short, almost parallel to the lower surface with which it is united by means of a narrow area, rather deeply arcuately embayed on the lingual side. The angular process is thin, straight, elongated. The mental foramen is set at half-length of the M_1.

Teeth without pigmentation. In the available specimen I_2 has its tip broken off, but the preserved portion shows that there were no accessory lobes on the cutting surface. P_1 is not preserved. P_4 is uni-cuspidate. M_1-M_3 have a strongly developed cingulum. In M_3 the talonid is greatly reduced, one cusped. This tooth consists almost entirely of the trigonid, the talonid being but one fourth of the length of tooth and considerably lower than the trigonid.

Dimensions. The perfect mandibular ramus is 5.75 mm long. Its height measured below M_2, on the inner side, is 0.85 mm; length of tooth-row without the I_2 about 3.2 mm, length M_1-M_3 2.6 mm, thickness of mandibular ramus below M_2 0.8 mm. The preserved fragment of another mandible shows the height of the ramus under the second lower molar to be 0.92 mm, thickness 0.6 mm. The M_1 is about 1.0 mm long and 0.6 mm broad.

Systematic position. — The lack of tooth pigmentation and the absence of the third tubercle in M_3 suggest the assignment of the found specimens to the subfamily of Crocidurinae. On their extremely small dimensions they are referable to no other genus but *Suncus* Ehrenberg. From *S. etruscus* (Savi), the only recent representative of genus *Suncus* Ehrenberg, encountered within Europe, our form differs by its smaller dimensions and unusually strong reduction of talonid in M_3. Furthermore, in Podlesice specimens, the coronoid process is gently inclined to the front, and the mental foramen is placed at midpoint of M_1, instead of between P_4 and M_1, as it is in *S. etruscus* (Savi).

In 1934 species *Suncus pannonicus* (Kormos) was described by T. Kormos from the „Preglacial" of Hungary, on 3 fragments of mandible. This description agrees with the features of our specimens, the length of the perfect mandibular ramus from Hungary, however, was 6.3 mm, while that in our specimen was hardly 5.75 mm. The height and thickness of the mandible are also somewhat greater in the Hungarian specimen, but the length of the row of molars is identical, being in both cases 2.6 mm. On comparing with holotype in the collection at the Zoological Department of the National Museum in Budapest, it was found that the coronoid process in Podlesice specimens is lower and shorter than that in the holotype. Material available from Podlesice and Hungary being scanty, it is impossible to ascertain whether these differences range beyond individual variability.

T. Kormos (1934) is of the opinion that the exceptional reduction of the third lower molar may suggest the inclusion of *S. pannonicus* (Kor-

mos) described by him, to a new genus which should then be called „*Allopachyura*". But unfortunately, our material also confined to fragments of mandible, is by no means more adequate, so as to lead to a solution of this problem. All the subfamily of Crocidurinae show a tendency to reduce their M_3; we also encounter this tendency, with varying intensity, in other species of genus *Suncus* Ehrenberg. The evidence, therefore, for the establishment of a new genus "*Allopachyura*" is not too strong.

Chiroptera Blumenbach, 1779

Family **Rhinolophidae** Bell, 1836

Genus *Rhinolophus* Lecépède, 1799

Rhinolophus cf. *ferrumequinum* (Schreber, 1774)

(pl. II, fig. 5, 6)

Material. — The anterior portion of the skull, with preserved P_4-M_3 of both sides of the jaw (teeth notation after G. S. Miller, 1907), 20 fragments of maxilla, 27 mandibles and their fragments.

Description. — The form of the rostral part of skull is similar to that in recent specimens of *R. ferrumequinum* (Schreber). The upper canine is large, but its cingulum is somewhat less strongly developed than in studied recent specimens. The anterior premolar is always present, though it is slight and projecting outwards from the maxillary tooth-row. P^4 resembles that in recent specimens. M^1 shows a broadened out coronal base which forms a characteristic embayment on the lingual side, directed backwards. In the second molar this embayment is less distinct though it is more strongly developed than in recent specimens. Outside of this detail, the upper molars agree with those in recent skulls available to the writer.

The coronoid process is low, rounded, passing by a gently sloping margin backwards into the articular process. The angular process is elongated, narrow. The mental foramen is placed below P_1. The surface of the symphysis is ovate, somewhat pointed at the ends. The first incisor is not perfectly preserved in any of the found mandibles. The second incisor is with three distinct uniseriate tubercles. The canine is lower than in recent specimens available to the writer for examination; it is also less strongly curved. P_2 is low, conical. P_2 and P_4 do not unite as in the examined specimens of recent forms; a fissure is seen intervening into which P_3 is squeezed which has been pushed out of the tooth-row. P_3 generally displays weaker reduction than that in recent specimens available to the author for the sake of comparison. P_4-M_3 have developed as those in recent specimens.

Dimensions (in mm):

Maxilla	1	2	3	4	5	6
length of P_4 — M_3	6.4	6.5	6.4	6.5	6.5	6.9
,, M_1 — M_3	5.3	5.3	5.3	5.2	5.3	5.7

Mandibles	7	8	9	10	11
mandibular length	16.2	16.3	16.4	—	16.3
length of tooth-row	10.0	9.8	9.9	9.5	10.0
,, C —M_3	9.2	9.1	9.2	9.5	9.5
,, M_1 — M_3	6.0	6.0	5.9	5.2	6.3
height of mandibular ramus from inside under M_2	2.1	2.0	2.1	2.1	1.9
thickness of mandibular ramus below M_2	0.9	0.9	1.0	1.1	1.0

Mandibles (continued)	12	13	14	15	16
mandibular length	—	—	—	—	—
length of tooth-row	10.2	10.5	10.2	9.8	—
,, C — M_3	9.5	9.8	9.5	8.9	—
,, M_1 — M_3	6.3	6.3	6.2	6.0	6.1
height of mandibular ramus from inside under M_2	2.1	2.1	2.0	2.0	2.0
thickness of mandibular ramus below M_2	1.0	1.0	1.1	1.0	1.0

Systematic position. — The here described remains do not in any essential way differ from recent specimens of *Rhinolophus ferrumequinum* (Schreber) from central Europe, available for comparison to the author. The morphological differences that have been observed, such as a somewhat different form of the second upper molar, lower mandibular canine and weaker reduction of the third lower premolar, are probably no more than individual variations, and closer examination and investigation in this respect of numerous series of fossil and recent specimens would be needed to determine if they are different. A most peculiar feature is the persistance until now of M_3, a tooth displaying such extreme slightness in fossil specimens that it must have, in all probability, been completely hidden in the gum and should be regarded as a vestigial organ. The dimensions of the fossil specimens are somewhat smaller than those given by G. S. Miller (1912), for recent specimens, but approaching those cited by F. Heller (1936*a*) for both fossil and recent material. In any case, these differences of size are quite unimportant.

Remains of a bat referred to as "*Rhinolophus* aff. *ferrumequinum* Schreber" are recorded from early Pleistocene deposits of Germany, Po-

land, Hungary, Rumania and China. From Choukoutien, C. C. Young (1934) describes a new form, *R. pleistocaenicus* Young, approaching *R. ferrumequinum* (Schreber). The description of this new form is not sufficiently detailed and lacks a comparison with recent forms which makes difficult the determination of its systematic position.

Family **Vespertilionidae** Gray, 1821

Subfamily **Miniopterinae** Miller, 1907

Genus *Miniopterus* Bonaparte, 1837

Miniopterus schreibersi Kuhl, 1819

(pl. II, fig. 4)

Material. — Four perfect mandibles and one fragment of mandible. The teeth represented by this material are P_3-M_3.

Description. — The coronoid process is low, curving frontally. The margin between it and the articular process runs almost horizontally. The articular process is mound-like, set perpendicularly to the long axis of the mandibular ramus. The articular process is directed obliquely outwards. The mental process is large, it lies between C and P_2.

No incisors or canines are preserved. The alveolar of the canine is rather small, ovate. P_2 is fairly large, with one root. P_3 was larger than P_2, with two roots, pyramidal, showing a distinct cingulum. P_4 is one and a half times as large as P_3, also prismatic, with its apex in line with tips of molars.

Dimensions (in mm):

Mandibles	*1*	*2*	*3*	*4*	*5*
mandibular length	10.5	—	10.3	10.5	—
length of tooth-row	7.0	7.0	6.9	6.7	—
„ C — M_3	6.1	—	—	6.2	—
„ P_4 — M_3	4.3	—	—	4.5	—
„ M_1 — M_3	3.8	3.9	—	3.7	
height of mandibular ramus from inside below M_2	1.4	1.4	1.4	1.4	1.4
thickness of mandibular ramus under M_2	0.6	0.7	0.7	0.6	0.8

Systematic position. — Number of premolars, their increasing size from P_2-P_4 and two roots of P_3 all suggest their assignment to genus *Miniopterus* Bonaparte. A comparison of recent specimens of *M. schreibersi* (Kuhl) with fossil specimens from Podlesice has shown them to agree perfectly in form of mandibular ramus, dentition and size.

Miniopterus schreibersi (Kuhl) now has a wide range of distribution within the tropics and the warmer belts of the moderate zone of the Old World. From earlier Pleistocene deposits it has thus far been recorded from Germany, Rumania and China. The described fossil remains have displayed no differences as compared to living forms.

Subfamily **Vespertilioninae** Miller, 1879
Genus *Plecotus* Geoffroy, 1813
Plecotus crassidens Kormos, 1930
(pl. III, fig. 1, 2)

1930. *Plecotus crassidens* n. sp.; T. Kormos, Diagnosen..., p. 238.

Material. — Two damaged skulls with destroyed braincases, two other fragments of skull, 6 mandibles. The teeth represented in this material are P^4-M^3 and P_4-M_3.

Description. — The rostrum is broad, much more so than in *Plecotus auritus* (Linnaeus). The notch at the front of the rostrum is differently shaped than that in *P. auritus* (Linnaeus), it is broader and its palatal aspect is cordate and not rounded. The bony palate reaches backwards beyond the tooth-row to a distance equal to one molar breadth. The rostrum is flattened, distinctly depressed in the cranial axis, without lacrimal ridge.

In P^4 the labial portion is broader and not so obliquely set as that in *P. auritus* (Linnaeus). M^1-M^3 are larger and more massive than in living form.

The coronoid process is distinctly pointed. Its posterior margin curves arcuately downwards to the articular process which is in shape of a mound. The angular process curves backward to the outside, it is broad, with a blunt end. The horizontal portion of the mandibular ramus is low, broad, rounded from the outside. In most mandibles the mental process is placed between the canine and P_2, or under the latter, in one of the mandibles it is between P_2 and P_3. The symphysis is broadly oval.

The alveolus of the canine indicates its small size. On evidence of the alveolus P_3 was not large, smaller than P_2. In P_4 the coronal base is subquadrate with a strong cingulum. Its crown does not extend to the level of molar tips. The molars are large, with sharply pointed cusps and a strong cingulum. In M_3 the talonid is narrower than the trigonid. The molars are broader and more robust than those in *Plecotus auritus* (Linnaeus).

Dimensions (in mm):

Skulls	*1*	*2*	*3*
length of tooth-row (alveolar)	6.4	6.3	6.5
„ $P^4 - M^3$	4.4	4.1	4.3
„ $M_1 - M_3$	3.5	3.2	3.2
interorbital constriction	4.6	4.7	—

Mandibles	*4*	*5*	*6*	*7*	*8*	*9*
mandibular length	10.6	10.8	10.8	—	—	10.7
length of tooth-row	6.7	6.7	6.7	—	—	6.8
„ $C - M_3$	5.6	—	—	—	—	—
„ $P_4 - M_3$	4.3	—	—	—	—	—
„ $M_1 - M_3$	3.7	—	—	—	—	—
height of mandibular ramus	1.5	1.2	1.5	1.5	1.1	1.4
thickness of same	0.7	0.7	0.7	0.7	0.7	0.8

Systematic position. — In the specimens of bats recovered from the Podlesice material, skulls and mandibles are detached without anatomic connection. This makes it extremely difficult to fit in skulls to their proper mandibles. The skulls here described differ dinstinctly from those of *Myotis* Kaup, which predominate numerically. They show but two maxillar premolars, while the *Myotis* Kaup have three. In the mandibular material a group of mandibles is well differentiated, showing a different shape of the coronoid process and a low and broad mandibular process. From among eligible genera, only *Myotis* Kaup, *Miniopterus* Bonaparte and *Plecotus* Geoffroy are with three premolars. Genus *Miniopterus* Bonaparte can readily be distinguished on proportions of its P_2 and P_3, and the presence of two roots in P_3. Taking into consideration the shape of the coronoid process, the smaller hight of P_4 as compared with that of the molars and the strong differentiation shown by the proportions of the mandibular ramus from those in the majority of other mandibles, the here mentioned group of mandibles is doubtlessly referable to genus *Plecotus* Geoffroy. By the skulls these also approach genus *Plecotus* Geoffroy, though they do show a number of important differences from *P. auritus* (Linnaeus), the only living representative of that genus.

The conspecific identity of the here described skulls and mandibles is confirmed by the numerical correlation of the found specimens: 4 skulls, 6 halves of mandibles (4 right-side ones), by the agreement in dimensions, particularly so the identical molar breadth and similar length of tooth row, namely from 6.3 to 6.5 mm in the maxilla and from 6.7 to

6.8 mm in the mandible, these being in agreement with proportions shown by the living species, *P. auritus* (Linnaeus).

Upon ascertaining conspecific identity of the here described skulls and mandibles we may give its dental formula as follows:

$$\begin{array}{cccc} 2 & 1 & 2 & 3 \\ 3 & 1 & 3 & 3 \end{array}$$

Among the Old World bats this formula is found in genera *Plecotus* Geoffroy and *Miniopterus* Bonaparte only. Genus *Miniopterus* Bonaparte, however, may not be here taken into consideration owing to differences of cranial and mandibular structure as here above mentioned. We may therefore refer the described bat to genus *Plecotus* Geoffroy.

In recent fauna genus *Plecotus* Geoffroy is represented by one species only, the *P. auritus* (Linnaeus) with several subspecies. It was also mentioned by T. Kormos (1937*a*) from Püspökfürdö and Brasso from the „Preglacial" of Rumania, by F. Heller (1930*b*, 1936*a*) from the early Pleistocene of Moggaster Höhle and Gundersheim in Germany, and from the German cave Gaisloch by G. Brunner (1950). In addition to these, a new species, the *Plecotus abeli* Wettstein was described by O. Wettstein-Westersheim (1931) from the younger Pleistocene deposits of Drachenhöhle in Austria, and *P. crassidens* Kormos by T. Kormos (1930*a*) from the „Preglacial" of Püspökfürdö in Rumania.

The here described Podlesice remains differ from the living species by a number of diagnostic characters mentioned above. These differences are most striking in the structure of skull, less distinct in that of the mandible. The latter, however, is distinctly more robust and provided with larger dentition in the fossil form. A comparison of the Podlesice specimens with the Pleistocene finds identified with *Plecotus auritus* (Linnaeus), from Moggaster Höhle, Gaisloch, Püspökfürdö and Brasso is impossible owing to lack of a description of these remains. F. Heller (1936*a*) gives the description, dimensions and photograph of the mandible of "*Plecotus* aff. *auritus* L." from Gundersheim, which he thinks identical with recent specimens, but want of clearness in the photograph and the superficial description do not allow a comparison with the Podlesice specimens. The dimensions of the mandible from Gundersheim are within the range of variations shown by the Podlesice form.

The late Pleistocene *Plecotus abeli* Wettstein is believed to be somewhat smaller than *P. auritus* (Linnaeus), the measurements, however, cited in the paper, do not confirm this. The skull of *P. abeli* Wettstein is asserted to be more narrow than that of the living species. This latter character bars it from relationship with the distinctly broader Podlesice

form. It would appear that *P. abeli* Wettstein may only be regarded as a subspecies of *P. auritus* (Linnaeus).

Plecotus crassidens Kormos has been reported on one detached mandible, very superficially described, with one dimension given only (P_4-M_3 being 4.45 mm) and not figured at all. In addition to unimportant and vaguely described differences in the structure of processes, this form is believed to differ from *P. auritus* (Linnaeus) by a lower crown of P_4 (which, however, is a feature dependent on the age of the individual), a more oblique position of this tooth and the breadth of M_3, regarded as the essential point of differentiation. This tooth believed to be equally broad, posteriorly and anteriorly, thus being far more massive. In the described Podlesice form it is true that M_3 shows a certain posterior narrowing, but it is actually more massive than that in *P. auritus* (Linnaeus). A comparison with the holotype in the palaeontological collection of the Geological Institute in Budapest shows that the characters of this holotype lie within the range of individual variability of the Podlesice specimens. The systematic position of the Polish specimens is, therefore, certain.

Cranial structure of the Podlesice specimens, so markedly differing from that in *P. auritus* (Linnaeus), may be suggestive of a species related to the American genus *Corynorhinus* Allen, which some writers, G. G. Simpson (1945) for example, do refer to genus *Plecotus* Geoffroy. Genus *Corynorhinus* Allen is distinguished by the absence of the lacrimal ridge, this being also the characteristic feature of the Podlesice specimens. Since the Americano-Eurasian connexions are decisively strong in the early Pleistocene, as referred to in the introduction to this paper, a suggestion of this kind does not seem devoid of probability. It, however, calls for confirmation on comparative material from genus *Corynorhinus* Allen.

Genus *Myotis* Kaup, 1829

Myotis podlesicensis n. sp.

(pl. II, fig. 7, 8)

Holotype. — Mandible with perfect processes and dentition, P_3 excepted.

Stratum typicum. — Günz-Mindel Interglacial.

Locus typicus. — Podlesice near Kroczyce, Olkusz district.

Derivatio nominis. — *podlesicensis* - from Podlesice, name of locality at which the here described bone breccia was discovered.

Material. — 1 skull, almost complete, 4 others damaged, also numerous cranial fragments, 12 almost complete mandibles and numerous mandibular fragments.

Description. — Skull fairly broad, the breadth of the braincase slightly exceeding that of the rostrum and attaining nearly half of the maximum cranial length. Dorsal section of skull gently ascending. The sagittal crest low but distinct, as is also the lambdoidal.

The upper incisors attaining half the length of the canine apply very close to each other, but are separated from the canine by a well marked diastema. They are both two-cusped, with a distinct cingulum on the second one. The upper canine is high, but narrow, strongly curving backwards. Its cingulum is low, yet it is distinct, not uniformly developed all round. The two first premolar teeth are crowded but to a varying extent in the several skulls; between the canine and P^2 or between P^3 and P^4 there may be a slight diastema. On P^2 and P^3 the cingulum is strongly developed. P^3 is slight, occasionally somewhat projected lingually from the tooth-row. On P^4 the cingulum does not develop accessory tubercles. The crown of P^4 protrudes strongly above the crowns of molars. The protoconule is absent from the cheek teeth. M^3 shows no signs of reduction, its metacone is well developed. The surface of M_3 is about three fourths that of M^2.

The coronoid process of the mandible is rather low, with its apex flattened. The angular process is pointed. The symphysis is broad, not too long. The mental foramen lies beneath the commisure of the canine with P_2 or beneath P_2.

The mandibular incisors are strongly imbricated. The I_1 shows three distinct tubercles and a fourth weaker one on the posterior end of the crown. This latter tubercle disappears in more worn teeth. The I_2 is slightly thicker than I_1 and in the principal axis of the tooth also shows four tubercles, their number being reduced to three in teeth which are more worn. There is another accessory tubercle on that tooth, lower than the other tubercles, placed on the lingual side. On the labial side this tooth has a distinct cingulum. The I_3 is twice as broad as I_2 and also displays a distinct cingulum both on the labial and the caudal side. There are two large tubercles on its outer side and from two to three lower ones, less distinct on the lingual side.

The canine is not large, gently curving backwards, with a distinct cingulum whose anterior margin is ascending. The first two premolars are loosely set, the second one being slightly smaller than the first. P_4 is with a distinct cingulum, its apex is flush with the apexes of the molars. The length of P_4 is about 1.1 mm, its breadth 0.7 mm, so that it has a slender elongate form. The talonid of M_3 does not show distinct reduction though it is narrower and lower than the trigonid.

Dimensions (in mm):

Skulls	*1*	*2*	*3*	*4*	*5*
condylobasal length	17.6	16.7	—	—	—
interorbital constriction	4.9	—	—	—	—
breadth of braincase	8.5	8.4	—	—	—
length of tooth-row	8.6	8.2	8.6	8.2	8,6

Mandibles	*1*	*2*	*3*	*4*	*5*
mandibular length	13.9	14.2	14.2	13.9	14.0
length I_1 — M_3	9.2	9.4	9.2	9.2	8.8
„ C — M_3	7.8	8.1	8.5	7.8	8.2
„ P_4 — M_3	5.4	5.4	5.7	5.5	6.0
„ M_1 — M_3	4.4	4.4	4.7	4.4	4.9
height of mandibular ramus on the inside under M_1	2.1	1.8	2.4	2.1	2.1
thickness of mandibular ramus under M_1	1,0	1.0	1.0	1.0	1.0
length of symphysis	3,2	3.0	3.2	3.2	3.2

Mandibles (continued)	*6*	*7*	*8*	*9*	*10*
mandibular length	13.7	13.9	14.3	14.0	—
length I_1 — M_3	9.0	9.0	9.4	9.4	9.2
„ C — M_3	7.8	7.4	8.4	8.0	8.4
„ P_4 — M_3	5.4	5.5	5.8	5.7	5.7
„ M_1 — M_3	4.4	4.4	4.7	4.5	4.6
height of mandibular ramus on the inside under M_1	1.9	2.0	1.9	1.8	2.0
thickness of mandibular ramus under M_1	1.0	1.0	1.0	1.0	1.0
length of symphysis	3.0	3.1	3.2	3.2	3.3

Systematic position. — Genus *Myotis* Kaup has the widest distribution and in all probability is the predominant genus of bats as respects number of forms, at the same time being one of the most primitive and most ancient genera. Nine species of this genus are now living in Europe, some of them have also been recorded from the Pleistocene; 13 extinct species have been described from Pleistocene deposits of Europe, partly perhaps referable also to the younger Pliocene. 8 of them have been collected in one site at Gundersheim, Germany (F. Heller, 1936*a*). Unfortunately, the descriptions of these forms made on evidence of mandibles only, do not give a clear picture of their mutual relationships and their connections with the living species. In any case it seems that representatives of genus *Myotis* Kaup have displayed considerable variability during

the Quaternary period, contrary to other markedly more conservative genera of bats.

It was not until quite recent years that G. H. Tate (1941) made an attempt at splitting up genus *Myotis* Kaup into subgenera, at the same time trying to determine their mutual relationships. It is to be regretted that his classification is based essentially on soft parts and therefore hardly applicable with respect to fossil material. In principle it is concerned with Old World forms only, though it may also be used in respect to American species. Some species, however, are not assignable to any of the subgenera described by G. H. Tate. Lately, A. P. Kuzjakin (1947), without referring to Tate's work and to his division into subgenera, has presented an endeavour at determining the relationship of the palaearctic species belonging to genus *Myotis* Kaup, essentially in agreement with the suggestions of the American writer. None of the papers, however, concerned with fossil bats, have thus far been based on the subgeneric systematics of genus *Myotis* Kaup.

According to G. H. Tate (1941), *Selysius* Bonaparte is the original and central subgenus within genus *Myotis* Kaup. It contains among others species *M. mystacinus* (Kuhl) and *M. emarginatus* (Geoffroy). The various lines of specialization are represented by the following subgenera: *Paramyotis* Bianchi (with the only Eurasian species *M. bechsteini* (Kuhl)); *Myotis* Kaup s. str. (including the species *M. myotis* (Borkhausen) and *M. oxygnathus* (Monticelli)); *Isotus* Kolenati (with species *M. nattereri* (Kuhl)); and *Leuconoe* Boie (species *M. daubentoni* (Kuhl), *H. dasycneme* (Boie)). The tropical subspecies *Chrysopteron* Jentink and *Rickettia* Bianchi are not here taken into account.

It is characteristic that the specialized subgenus of *Myotis* Kaup s. str. is rare in the Pleistocene, the only sure site of occurrence being that at Sutto (T. Kormos, 1937*a*) in Hungary, from rather late Pleistocene deposits. On the other hand, *Myotis bechsteini* (Kuhl), a relatively primitive form and very rare today, is one of the most abundant Pleistocene forms. Some of the fossil forms apparently represent intermediate links between the subgenera that have now been separated, for example *Myotis baranensis* Kormos displays initial characters of specialization common in subgenus *Myotis* s. str. The majority, however, of the fossil forms cannot be surely referred to any of the established subgenera.

The identification of material belonging to genus *Myotis* Kaup from Podlesice has met with considerable difficulties in spite of its satisfactory state of preservation and its great numerical abundance, i. e. several hundreds of well preserved mandibles. Skulls as well as mandibles were readily differentiated into four groups of various size, which enabled the specific correlation of skulls and mandibles. One of the size groups,

however, was found to contain two forms differing from each other by structure of dentition both maxillar and mandibular. The correlation of skulls and mandibles was also possible through a comparative analysis of the extent of reduction in M_3 and M^3, the degree of tightness in the premolars, the breadth of molars, the shape of P^4 and P_4. It is regretted that a comparative study of the here considered forms with other fossil species was greatly hindered by the inadequateness of the available descriptions based solely on mandibles.

Myotis podlesicensis n. sp., which is the largest species belonging to genus *Myotis* Kaup from Podlesice, cannot be surely identified with any recent European species. Its assignment to subgenus *Myotis* Kaup s. str., which is also very closely approached by the extinct species *M. baranensis* Kormos, is barred by its size being too small and by the weak reduction of its M^3 and of the talonid of M_3. Neither is it referable to subgenus *Leuconoe* Boie owing to lack of protocones on maxillar molars, while the only species of subgenus *Isotus* Kolenati, i. e. *M. nattereri* (Kuhl) displays markedly smaller dimensions and a different structure of the mandibular incisors. From *M. bechsteini* (Kuhl) *M. podlesicensis* n. sp. differs by different position of the mental foramen and by larger dimensions. Finally, all the recent species of genus *Selysius* Bonaparte are considerably smaller.

Among the early Pleistocene forms, similarity of dimensions to *M. podlesicensis* n. sp. are shown by *M. wüsti* Kormos from the „Preglacial" of Hungary (T. Kormos, 1934) and three species described by F. Heller (1936*a*) from Gundersheim in Germany, namely: *M. kormosi* Heller, *M. rapax* Heller and *M. aemulus* Heller. *M. wüsti* Kormos is distinguished by a thickening of the mandibular ramus beneath P_2 and P_3 (this character, seen in the drawing as well as in the specimen itself, is surprisingly not mentioned in the description), further by an embayment between the coronoid and the articular processes which is weaker than that in the Podlesice form, finally by difference in structure of I_3. *M. kormosi* Heller is with a strongly characteristic, extremely high coronoid process, different from that in *M. podlesicensis* n. sp. *M. rapas* Heller, by F. Heller (1936*a*) asserted as related to *M. nattereri* (Kuhl), is known but fragmentally owing to lack of a number of teeth in the mandible from Gundersheim, but from identity with *M. podlesicensis* n. sp. it is barred by the different proportions of P_4. In the species from Germany this tooth is broad (0,8 mm broad and 1.0 mm long), while in *M. podlesicensis* n. sp. it is markedly elongated, being 0.7 mm broad and 1.1 mm long. Finally, *M. aemulus* Heller is with the coronoid process lower than that in *M. podlesicensis* n. sp. and with somewhat smaller dimensions, the proportions of teeth in this species being nearly the same as in our form.

All this is evidence for the establishment of a new species, the *M. podlesicensis* n. sp., possibly closely related to *M. aemulus* Heller and in all probability constituting an intermediary link between genera *Selysius* Bonaparte and *Myotis* Kaup s. str.

Myotis cf. *aemulus* Heller, 1936

(pl. III, fig. 5, 6)

Material. — 10 skulls and 10 complete mandibles have been worked out. In addition, the material contains fragments representing some dozen skulls and several hundred mandibles or their fragments.

Description. — The skull is rather broad, the braincase distinctly broader than the rostrum, its breadth being somewhat less than half the maximum cranial length. The dorsal profile shows a distinct breaking in beyond the rostrum, and then steeply ascends. The sagittal crest is not uniformly developed, being distinct and rather high in some of the specimens. The lambdoidal crest is low.

The upper incisors attain two thirds of the canine length. They are set close to one another and are separated from the canine by a conspicuous diastema. The first of them is larger than the second. Both incisors are with two cusps, a cingulum is to be seen on the second of them. The canine is relatively broad, not too high, gently curving backwards. Its cingulum is low but distinct, fairly evenly developed around the crown. The two first premolar teeth apply very closely to one another, the second of them being pushed somewhat inwards from the line of the tooth-row. The second upper premolar (P^3) is half the size of the first (P^2). On both these teeth the cingulum is well developed. The crown in P^4 is not large, its cingulum has not developed accessory tubercles. The molars are without protoconules. M^3 is not reduced, with metacone well developed; its surface is almost two thirds that of M^2.

The coronoid process of mandible is moderately high, the ridge between it and the articular process being either nearly straight or gently curving upwards in the upper portion, while in its lower portion it is curving upwards. The angular process is moderately long, pointed at the end. The mental foramen is between the canine and P_2. The symphysis is large, broadly ovate.

The imbrication of the lower incisors extends over from one fourth to one third of their length. The first of them is with 4 tubercles arranged in a row, the second, in addition to 4 similar tubercles (of which the fourth posterior one is the smallest) has a fifth accessory tubercle on the lingual side. The latter incisor is somewhat broader than the former and displays a distinct cingulum on the labial side. The third incisor is twice

as broad as the second one. Its crown consists of two anterior tubercles and three low posterior ones, indistinctly indicated. There is a well marked cingulum on the labial side of this tooth. The canine is not large, gently curving backwards, with a distinct cingulum, the margin of which strongly ascends from the front of the tooth. Of the first two premolars, the second is somewhat smaller. The cingulum on P_2 overlaps the cingulum of the canine, while in P_3 the posterior margin touches the margin of P_4. In the last premolar the apex is flush with the molars, somewhat curving backwards. Its crown is about 1.00 mm long, its breadth 0.65 mm, so that it is distinctly elongated. The talonid of M_3 shows no distinct reduction.

Dimensions (in mm):

Skulls	*1*	*2*	*3*	*4*	*5*
condylobasal length	16.6	16.5	16.4	16.2	—
zygomatic breadth	11.1	11.5	11.1	—	—
interorbital constriction	4.2	4.6	4.2	4.2	4.3
breadth of braincase	7.7	8.8	7.8	8.0	8.0
length of tooth-row	8.1	8.1	7.9	7.9	—
Skulls (continued)	*6*	*7*	*8*	*9*	*10*
condylobasal length	—	—	—	—	-
zygomatic breadth	—	—	—	-	—
interorbital constriction	4.3	4.2	4.2	4.0	4.1
breadth of braincase	—	—	—	—	—
length of tooth-row	8.2	8.2	8.3	8.0	8.2

(continued on p. 369)

Systematic position. — The described Podlesice species is shown to agree perfectly in dimensions with those of the mandible of *M. aemulus* Heller recorded from Gundersheim (F. Heller, 1936*a*). The morphology of this mandible and of the teeth preserved with it is also in agreement with that of the Podlesice remains, the coronoid process excepted, as this seems somewhat lower than in specimens from Germany. Unfortunately, *M. aemulus* Heller is only very superficially known on evidence of the mandible and part of dentition as preserved with it, i. e. the canine and P_2-M_3, so that it is impossible to compare the incisors which are of such taxonomic importance. From *M. podlesicensis* n. sp. the remains of *M.* cf. *aemulus* Heller from Podlesice differ in slightly but distinctly smaller dimensions. The skull of *M. podlesicensis* n. sp. is more elongated and its profile more flattened, not depressed beyond the rostrum, also the canine

is here higher and narrower, more curving backwards. The other characters agree perfectly in both species so that the differences given in the description of *M. podlesicensis* n. sp. in respect to other recent and

Dimensions in mm *(continued from p. 368)*

Mandibles	1	2	3	4	5
mandibular length	13.1	12.6	13.3	13.4	13.2
length I_1 — M_3	8.8	8.6	9.0	8.9	8.9
„ C — M_3	7.6	7.3	7.7	7.6	7.7
.. P_4 — M_3	5.3	5.3	5.4	5.3	5.2
„ M_1 — M_3	4.3	4.3	4.4	4.2	4.2
height of mandibular ramus from inside under M_1	1.8	1.7	2.0	1.8	2.0
thickness of same under M_1	0.9	0.8	0.9	0.8	0.9
length of symphysis	3.0	2.7	2.8	3.0	2.9

Mandibles (continued)	6	7	8	9	10
mandibular length	13.0	13.0	13.3	12.8	12.9
length I_1 — M_3	9.0	8.9	8.9	8.6	8.8
„ C — M_3	7.6	7.6	7.6	7.5	7.7
.. P_1 — M_3	5.4	5.4	5.3	5.2	5.6
„ M_1 — M_3	4.4	4.4	4.3	4.2	4.5
height of mandibular ramus from inside under M_1	2.0	1.8	1.9	1.8	1.9
thickness of same under M_1	0.9	0.8	0.9	0.8	0.9
length of symphysis	2.9	2.8	2.9	2.8	2.8

fossil forms also refer to *M.* cf. *aemulus* Heller. It would be admissible that we have to deal here with individuals of different sex, and not with two separate species; in the living forms of genus *Myotis* Kaup, however, differences of sex are not very clearly indicated by cranial structure. The simultaneous occurrence of two markedly similar species of bats, as for instance in the case of *M. myotis* (Borkhausen) and *M. oxygnathus* (Monticelli), is quite common.

Myotis dasycneme (Boie, 1823)

Myotis dasycneme subtilis n. subsp.

(pl. III, fig. 3, 4)

Holotype. — Mandible with perfect processes and teeth C-M_3.

Stratum typicum. — Günz-Mindel Interglacial.

Locus typicus. — Podlesice near Kroczyce, Olkusz district.

Derivatio nominis. — *subtilis* - of a more delicate structure than that of *M. dasycneme* (Boie).

Material. — 12 fragments of skulls, 3 halves of mandibles. The preserved remains represent the whole dentition, the third upper incisor excepted.

Description. — Of the skull the rostrum only is recorded. It is very broad. The orbits are delimited at the front and top by a conspicuous lacrimal crest. The posterior palatal region is broad, with its hind end pushed outside of the tooth-row to a distance equal to one breadth of the molars.

The first upper incisor (I^2) is two-cusped, with a conspicuous cingulum forming two small accessory tubercles on the posterior tooth margin. The second incisor is not preserved in the considered material. The diastema between the incisors and the canine is not great. The canine is fairly large, nearly straight, with a low cingulum. Its alveolar is broadly ovate. The two first premolars are very minute, loosely arranged. The second of them (P^3) is pushed somewhat inside of the tooth-row, it is smaller than the first, its apex hardly extending to the height of the cingulum of the last premolar. P^4 is triangular, with the apex exceeding in height the crowns of the molars. A distinct protoconule is displayed by the molars. Large free spaces are to be seen between the last premolar and the first molar, also between the molars, as these teeth are very loosely set. The last molar is not reduced, its metacone is well developed.

The shape of the coronoid process is variable, but it is never too high, rounded at top, in its hind part flatly arching downwards to the articular process. The articular process is pointed and narrow. The mental foramen is set between the canine and P_2. The symphysis is ovate, elongate.

The incisors are inconspicuously imbricated. The first lower incisor is with four tubercles uniserially arranged. In the second lower incisor three tubercles are arranged in one row, while the fourth large tubercle has developed at the termination of the tooth on the inside. The third lower incisor is very broad, nearly three times as broad as the second incisor, with two larger tubercles on the outside and anteriorly and two smaller tubercles on the inside and posteriorly. This tooth is with a conspicuous cingulum and is placed so as to contact the canine at one point only. The canine is not large, weakly curved. Its cingulum forms an indistinctly indicated accessory tubercle on the antero-lingual margin. The two first premolars are small, rather loosely spaced. In spite of the loose arrangement the second molar (P_3) is distinctly flattened. It is conspicuously smaller than P_2. The cingulum in the two first premolars is quite distinct. P_4 is almost quadrate, 0.7 mm broad and 0.75 mm long. The molars are broad, the talonid in M_3 is but slightly narrower than the trigonid.

Dimensions (in mm):

Skulls	*1*	*2*	*3*	*4*
interorbital constricton	5.0	—	—	—
length of tooth-row	7.0	7.3	7.3	7.4

Mandibles	*1*	*2*	*3*	*4*
mandibular length	11.8	11.9	11.5	11.9
length I_1 — M_3	7.8	7.8	7.8	7.8
„ C — M_3	6.8	6.5	6.6	–
„ P_4 — M_3	5.0	4.6	4.5	—
„ M_1 — M_3	4.1	3.9	3.8	
height of mandibular ramus on the inside below M_1	1.5	1.6	1.4	–
thickness of same below M_1	0.8	0.8	0.8	0.7
length of symphysis	2.6	2.4	2.5	2.6

Systematic position. — On the presence of protoconules of maxillar molars the described species is readily referable to subgenus *Leuconoe* Boie. This subgenus may be further subdivided into a number of separate sections (G. H. Tate, 1941), among which the *dasycneme* section is distinguished by the reduction and displacement to the inside of the central maxillar premolar. This character is clearly seen in the Podlesice form, and suggests its assignment to the *dasycneme* section, containing the European species of *Myotis dasycneme* (Boie) and two tropical species, the *M. macrotarsus* Waterhouse and *M. stalkeri* Thomas. The two last species cannot be here taken into account owing to the greater reduction of the central premolar of the maxilla. All these suggests the assignment of the described remains to species *M. dasycneme* (Boie). On the somewhat smaller dimensions, however, of the Podlesice specimens, most particularly on the distinctly narrower and more delicately built molars, it is possible to differentiate them from the typical living form of the species as a subspecies called *subtilis* n. subsp.

Of fossil forms, known on the mandible only, and therefore rather difficult as regards closer systematic determination, the species *M. delicatus* Heller and *M. praevius* Heller from Gundersheim (F. Heller, 1936*a*) approach by their size the Podlesice specimens. *M. delicatus* Heller is known from a rather fragmentary description and photographs. In this species the central mandibular premolar is half the size of the first, while in *M. dasycneme subtilis* n. subsp. it attains two thirds of the height of that tooth. In *M. delicatus* Heller the premolars are closely applied to each other, and P_3 is partly overlapped by P_4, while in *M. dasycneme subtilis* n. subsp. P_4 does not overlap P_2. Finally, the last premolar (P_4) is 0.8 mm long and 0.6 mm broad in the case of *M. delicatus*

Heller, thus being distincly elongated, while in the case of *M. dasycneme subtilis* n. subsp. it is almost quadrate. In *M. praevius* Heller the shape of the coronoid process differs from that in the Podlesice form; it is larger and with a distinctly elongated P_4, its length being 1.0 mm against 0.6 mm breadth. Other fossil species recorded from the Pleistocene and Pliocene of Europe cannot be here taken into consideration owing to great differences of size.

Myotis danutae n. sp.
(pl. IV, fig. 1, 2)

Holotype. — Mandible with I_1-I_2, C, P_3-M_3.
Stratum typicum. — Günz-Mindel Interglacial.
Locus typicus. — Podlesice near Kroczyce, Olkusz district.
Derivatio nominis. — *danutae*-from Danuta, the name of the author's wife.

Material. — 4 skulls in fragments, 7 halves of mandibles, the full dentition being represented by the preserved material.

Description. — Skull elongated, rostrum rather narrow. The bone palate is narrow, extending backwards beyond the tooth-row for a distance one and a half times as large as the width of molars. The cranial profile is flat, without the depression on the profile between the rostrum and the braincase. The sagittal and lambdoidal crests are wanting. The lacrimal crest is inconspicuous.

The first upper incisor is with two cusps. In addition to the principal cusp on the lingual side, the second incisor is provided with a small tubercle on its indistinctly marked cingulum. There is a small diastema between the incisors and the canine. The incisors reach two thirds of the height of the canine. The canine is small, very gently curving backwards. Its cingulum is weak, uniformly developed around the crown of the tooth, without accessory tubercles. The first two premolars are slight, loosely spaced. In both of them the cingulum is distinctly marked, neither of them is displaced from the tooth-row. P^3 is smaller than P^2 and but quite slightly exceeds the height of the cingulum in P^4. The last premolar is triangular, provided with a conspicuous cutting edge which descends from the apex towards the parastyle of M^1. The apex of P^4 only slightly exceeds the height of the molar apexes. The molars lack protoconules, M^3 bears traces of reduction, but its metacone still persists.

The coronoid process is rather high, pointed at top. The margin between it and the angular process is gently arcuately curving upwards. The angular process is somewhat arched, narrow, pointed. The mental foramen is between the canine and P_2. The symphysis is ovate, moderately broad.

The crown of I_1 has four tubercles arranged in one row. I_2 is much like the first, but on the outside it is provided with an accessory tubercle

showing, however, only weak development. I_3 is more than twice the breadth of the second; on the labial side it has three larger tubercles, while on the lingual side there are two larger tubercles centrally and two very slight ones on the outside. The canine is slender, gently curving backwards. Its cingulum has a thickening in the form of a tall but indistinctly differentiated cusp, at the front of the tooth. The two first premolars are freely set, in line with the tooth-row. The second is quite inconspicuously smaller than the first. The last premolar is of a height equal to that of the molars. It is strongly elongated, 0.8 mm long and 0.5 mm broad. The molars are fairly broad, the talonid in M_3 is not reduced, though it is narrower and lower than the trigonid.

Dimensions (in mm):

Skulls	*1*	*2*	*3*	*4*
interorbital constriction	4.0	—	—	—
length of tooth-row	7.3	7.4	7.2	7.5

Mandibles	*1*	*2*	*3*	*4*	*5*	*6*	*7*
mandibular length	11.6	11.5	11.9	11.5	11.5	11.3	—
length I_1 — M_3	7.6	7.6	7.8	7.5	7.5	7.4	7.7
„ C — M_3	6.4	6.5	6.7	6.3	6.3	6.4	6.2
„ P_4 — M_3	4.6	4.7	4.7	4.4	4.5	4.6	4.5
„ M_1 — M_3	3.8	3.8	3.9	3.7	3.7	3.8	3.8
height of mandibular ramus from the inside below M_1	1.6	1.7	1.4	1.6	1.4	1.4	1.5
thickness of same below M_1	0.9	0.8	0.8	0.9	0.8	0.8	0 8
length of symphysis		2.6	2.5	2.5	2.4	2.4	2.5

Systematic position. — The species here described cannot be identified with any one of the recent or Pleistocene Eurasiatic species from genus *Myotis* Kaup. Lack of reduction in M_3 at first sight bars it from being referred to subgenus *Myotis* Kaup s. str., while the absence of protoconule on the maxillar molars prohibits its assignment to subgenus *Leuconoe* Boie. From the other recent species of genus *Myotis* Kaup, *M. danutae* n. sp. differs by its dimensions. Among fossil forms all early Pleistocene species of genus *Myotis* Kaup from Hungary are of larger size. Thus, the only comparable species are those described by F. Heller (1936*a*) from Gundersheim in Germany. From these, the species *M. praevius* Heller and *M. delicatus* Heller fall into the same size group as *M. danutae* n. sp. The former, however, differs from *M. danutae* n. sp. by its distinctly greater dimensions, higher coronoid process and larger canine, while the latter comes in size near the Podlesice form, but its P_2

and P_3 are tightened, P_3 is extremely slight attaining hardly half of the height of P_2. In *M. danutae* n. sp. P_2 and P_3 are freely spaced and P_3 is almost of equal size with P_2.

M. danutae n. sp. comes closest to the recent species *M. emarginatus* (Geoffroy), being, however, of smaller size, and to *M. nattereri* (Kuhl) which it exceeds in size.

Myotis cf. *exilis* Heller

(pl. IV, fig. 3, 4)

Material. — 21 fragments of skulls, numerous mandibles, preserved completely or in parts. The preserved material represents all the mandibular and maxillar teeth.

Description. — The breadth of the braincase is equal to half the maximal cranial length. The dorsal profile gently ascends from the rostrum to the braincase. The sagittal and lambdoidal crests lacking completely.

The first upper incisor is with two cusps, the second, in addition to the principal cusp, shows on the inside two small tubercles developed on the cingulum. The height of the incisors attains half that of the canine. Between the incisors and the canines there is a distinct break. The canine is not large, gently curving backwards, with a uniform, not very conspicuous cingulum. The first two premolars are rather small, in contact with each other, but not crowded together, with a conspicuous cingulum. These teeth are distinctly curved backwards. P^3 is slightly smaller than P^2. P^4 is not large, with its crown protruding somewhat above the points of the molars, and without accessory tubercles in its cingulum. There is a low but distinct protoconule on the maxillar molars. M^3 is not reduced, with well developed metacone, and the surface of the crown equal to three fourths of the surface in M^2.

The coronoid process is not particularly high, with a pointed apex. Its posterior margin extends perpendicularly to the horizontal mandibular ramus, towards the top bending a little to the front. The posterior margin of the coronoid process is almost straight, weakly bent. The angular process is short, pointed at the end and curving towards the top. A large mental foramen is placed below the point of contact between C and P_2. The symphysis is narrow and long.

The mandibular incisors are weakly imbricated. I_1 is three cusped, with an inconspicuous fourth tubercle on posterior margin of the crown. I_2 is with four cusps arranged in one row and a fifth accessory one on the lingual side. I_3 is not large, twice as thick as I_2, nearly quadratic. The crown of this tooth is with four tubercles: in addition to the largest, placed in the middle, we see a smaller posterior one, another anterior, of the same size as the posterior, and finally the fourth which is larger than the others and internal. Occasionally there may be accessory tubercles on the cin-

gulum, which is very strongly developed on the inside of this tooth. The mandibular canine is not large, gently curving backwards, with a stout cingulum which has developed anteriorly a rather small but characteristic tubercle. The first two premolars are in close contact with each other, this character being, however, individually variable. P_3 is somewhat smaller than P_2. P_4 is gently elongated, somewhat widened out posteriorly. It is from 0.5 to 0.6 mm broad, 0.7 mm long. M_3 shows no reduction.

Dimensions (in mm):

Skulls	*1*	*2*	*3*	*4*	*5*
condylobasal length	13.8	—	—	—	—
interorbital constriction	3.8	4.0	3.9	4.0	4.0
breadth of braincase	6.9	—	7.1	—	
length of tooth-row	6.8	6.7	6.6	—	6.5

Skulls (continued)	*6*	*7*	*8*	*9*	*10*
condylobasal length	—	—	—	—	—
interorbital constriction	4.0	—	—	4.0	—
breadth of braincase	—	—	—	—	—
length of tooth-row	6.4	6.4	6,6	6.4	6.8

Mandibles	*1*	*2*	*3*	*4*	*5*
mandibular length	10.0	10.3	—	10.2	—
length I_1 — M_3	7.1	6.8	—	6.9	6.9
,, C — M_3	5.8	5.7	5.9	5.8	6.1
,, P_4 — M_3	4.2	4.2	4.4	4.2	4.2
,, M_1 — M_3	3.5	3.6	3.7	3.4	3.5
height of mandibular ramus on the inside below M_1	1.4	1.5	1.3	1.3	1.4
thickness of same below M_1	0.7	0.7	0.7	0.7	0.7
length of symphysis	2.1	2.5	—	2.3	2.2

Mandibles (continued)	*6*	*7*	*8*	*9*	*10*
mandibular length	—	9.9	10.3	—	10 3
length I_1 — M_3	—	6.8	6.9	7.2	7.0
,, C — M_3	5.8	5.6	5.7	6.2	5.9
,, P_4 — M_3	4.2	4.0	4.2	4.3	4.4
,, M_1 — M_3	3.4	3.4	3.5	3.6	3.6
height of mandibular ramus on the inside below M_1	1.4	1.3	1.6	1.4	1.6
thickness of same below M_1	0.6	0.7	0.7	0.7	0.8
length of symphysis	—	2.1	2.1	2.1	2.5

Systematic position. — The presence of protoconule in maxillary molars refers the described form to subgenus *Leuconoe* Boie, while the position of P^3, not pushed out to the inside from the tooth-row, suggests its assignment to the *daubentoni* or *capaccinii* section. The Podlesice specimens are somewhat larger than *M. daubentoni* (Kuhl) but slightly smaller than *M. capaccinii* (Bonaparte). They also differ from *M. daubentoni* (Kuhl) in the weaker reduction of their P^3 and P_3 and in greater breadth between the inner margins of M^3 of the right and left maxilla. The difference from *M. capaccinii* (Bonaparte), whose specimens were regretfully not available to the writer for the sake of comparison, lies, according to the description of the living form given by A. P. Kuzjakin (1950). in that the breadth between the inner upper canine margins is equal to or greater than the breadth of the interorbital constriction as respects the living species, while in the fossil species the breadth here referred to is smaller.

Of the fossil forms, *Myotis exilis* Heller and *M. insignis* Heller from Gundersheim in Germany (F. Heller, 1936*a*) are the only ones to approach by size the Podlesice specimens. From our form, however, *M. insignis* Heller differs in that its first two mandibular premolars are of nearly the same height as that of the canine and of the last premolar, while in the Podlesice specimens they are distinctly smaller. On the other hand, however, the description of the species *M. exilis* Heller agrees perfectly with that of the remains collected at Podlesice. Most of their dimensions and the structure of processes are the same in these forms. They differ slightly by the proportions of some teeth only, i.e. in the German specimens the length of I_1-M_3 is somewhat greater, while the length of C-M_3, P_4-M_3 and M_1-M_3 slightly less which would suggest a greater length of I_1-I_3, both absolute and proportionate. Similarly, the height of the mandibular ramus is also smaller in the specimens from Germany. In spite of these differences, which to some extent may be accounted for by different techniques used for measurements, the Podlesice specimens may in all probability be referred to the form of *M. exilis* Heller, which would justify the assignment of this form to subgenus *Leuconoe* Boie, as related to *M. daubentoni* (Kuhl) and *M. capaccinii* (Bonaparte).

Rodentia Bowdich, 1821

Family **Cricetidae** Rochebrune, 1883

Subfamily **Microtinae** Miller, 1896

Genus *Mimomys* F. Major, 1902

Mimomys cf. *pusillus* (Méhely, 1914)

(pl. IV, fig. 7; text-fig. 2 a-e)

Material. — Complete mandible with M_1-M_3, mandible lacking the anterior portion with M_1-M_3, mandible with M_1 and M_3 damaged, detached teeth M^1 and M^2.

Description. — The only preserved M^1 belonged to an individual considerably younger that that which yielded the here described mandibles. Nevertheless, the roots here are already clearly indicated. On both sides of the crown three convexities and two concavities are visible. All the inner surfaces are broadly confluent.

M^2 is probably referable to the same individual as is M^1, since the extent of the wear is similar in both teeth. On the inner side this tooth has two salient angles, on the outer side three. All the loops are confluent with each other.

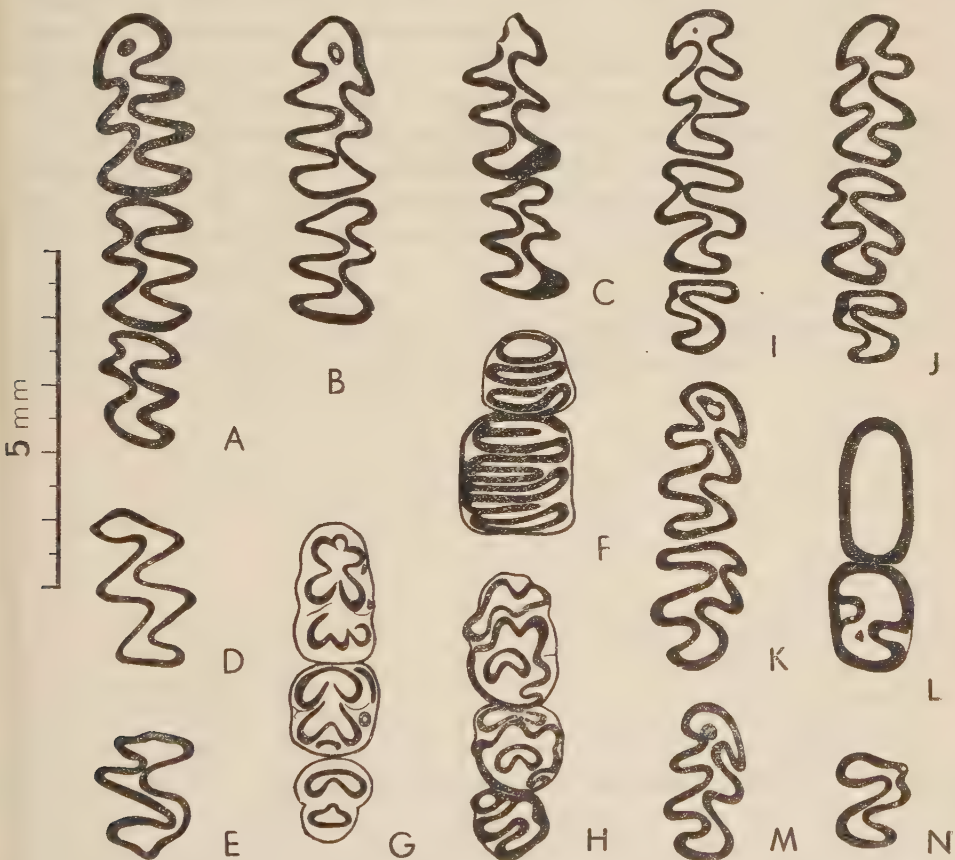

Fig. 2. — Enamel pattern of molar teeth. *Mimomys* cf. *pussilus* (Méhely): *a* left side of mandible (M_1-M_3), *b-c* right side of mandible (M_1-M_2), *d* M^1, *e* M^2; *Glis sackilingensis minor* n. subsp.: *f* P_4-M_1; *Parapodemus coronensis* Schaub: *g* M_1-M_3, *h* M^1-M^3; *Baranomys lóczyi* Kormos: *i-j* left side of mandible (M_1-M_3), *k* right side of mandible (M_1-M_2), *l* right M_1-M_2 of a very old individual, *m* M_1, *n* M_3.

The coronoid process descends to the mandibular ramus at the posterior loop of M_1. The alveole of the incisor extends to above the level of the dental foramen, and terminates by conspicuous tubercles on the outer mandibular surface.

In the re-entrant folds of molars, cement is fairly abundant. Besides the posterior loop M_1 has three triangles in the enamel pattern, which are narrowly confluent with each other and more widely confluent with the anterior loop. The anterior loop is strikingly short and with simplified pattern. In both of the investigated specimens it possesses a large islet of enamel. The only trace, besides the islet, of more complex loop structure, is a shallow concavity in one of the specimens and a vertical line on the surface of enamel in another, both seen on the outside. In two specimens the teeth are with two roots, in a third specimen there is an accessory slender median root. In the studied specimens the crowns are rather low, the roots clearly indicated. M_2 has three salient angles and two re-entrant folds on the inside as well as on the outside. All the loops are confluent with each other. The anterior loop is rounded frontally. M_3 has three salient angles and two deep re-entrant folds on the inner side. On the outer side there are also three salient angles and two re-entrant folds, but these are more shallow, the anterior one being quite inconspicuous.

Dimensions. The only preserved M^1 is 2.3 mm long, the only preserved M^2 1.8 mm long. The mandibular dimensions are as follows (in mm):

Mandibles	*1*	*2*	*3*
length of M_1 — M_3	6.0	—	5.5
„ M_1	2.5	—	2.4
breadth of M_1	1.2	1.3	1.2
length of M_2	1.7	1.7	1.7
„ M_3	1.1	—	1.3
height of mandibular ramus between M_1 and M_2	3.4	3.0	3.4
thickness of same	2.9	2.6	2.7

Systematic position. — The well differentiated genus *Mimomys* F. Major is readily separable into two specific groups. One of them, the *M. majori* Hinton group, comprises forms in which the reduction of the posterior loop is attained by being shallowed and not by insulation and formation of an islet of enamel (M. A. Hinton, 1926). The other group, that of *M. pliocaenicus* F. Major, forms an islet of enamel on the surface of the first loop. A part of the 10 forms belonging to the second group — among which we should search for species corresponding to the

Podlesice form — are probably synonyms of the variable species. Of no account to us are all large forms, such as *M. pliocaenicus* F. Major, *M. intermedius* (Newton), *M. hassiacus* Heller, *M. rex* Kormos and others. In *M. reidi* Hinton, a form approaching the Podlesice specimens, the islet of enamel becomes vestigial prior to the development of roots, moreover the first loop of enamel shows here extreme complexity. Perfect agreement of dimensions with those in the here described remains is displayed by *M. pusillus* (Méhely). In this species, characterized by its extensive variability, the islet of enamel disappears very soon, while in our specimens, in spite of strongly worn teeth, it is, nevertheless, quite distinctly indicated. Moreover, unusual shortening and simplification of the first loop of M_1 is a peculiar feature of the here described Podlesice specimens. Such simplicity of loop occurs in but one known species of this genus, i.e. in *M. moldavicus* Kormos, which, however, as compared against the Podlesice form, displays considerable difference of size (T. Kormos, 1932).

The Podlesice species of genus *Mimomys* F. Major thus shows closest similarity to the variable species *M. pusillus* (Méhely) though it does rather seem that it cannot be included within the variations of this form thus far known. Closer determination calls for investigation of mandibles belonging to young individuals with little worn molars. Distinct occurrence of the islet of enamel and its long persistance during the process of dental wear indicate that the here described specimens are more primitive than the greater part of the material representing *M. pusillus* (Méhely).

Cricetidae incertae sedis

Genus *Baranomys* Kormos, 1933

Baranomys lóczyi Kormos, 1933

(pl. IV, fig. 5; text-fig. 2 i-n)

1933. *Baranomys lóczyi* n. gen. & n. sp.; T. Kormos, Baranomys lóczyi..., p. 45-54, fig. 1-3.

1936. *Baranomys lóczyi* Kormos; F. Heller, Eine oberpliozäne Wirbeltierfauna..., p. 127-128, pl. 10 fig. 3.

1937. *Baranomys langenhani* n. sp.; F. Heller, Revision..., p. 245-246, fig. 1.

Material. — 6 mandibles, three of them with complete molars, two with M_1-M_2, one with M_3, also a detached M_1.

Description. — The coronoid process descends to the mandibular ramus at half length of M_2. The articular process is rather narrow and elongated. The angular process is arched, curving upwards.

The incisor is long, robust, weakly bent. Its cutting surface is long, somewhat depressed and sloping obliquely inwards. The enamel delimits

by a wide area the anterior margin of the incisor and descends on its outer wall.

The molars are low-crowned and have two long roots. The angles and folds of the enamel are rounded, the enamel is of uniform, rather considerable, thickness. Cement is found in the re-entrant folds. M_1 has, besides the two terminal loops, also three median triangles. The first loop is short, obliquely placed, subcrescent. Its pointed labial end is directed posteriorly. Extensive variability is to be noted in the structure of this loop. It may either be completely closed or confluent with the other loops by a wide pass, it may possess a barely distinguishable trace of an enamel islet or an islet taking up a greater part of the loop. The further three triangles in M_1, very exactly alternate, usually confluent with each other by rather wide passes. The terminal loop is slightly domed posteriorly, with its end pointing to the labial side. M_2 has three salient angles and two re-entrant folds on both, the outer and the inner side. The anterior inner fold is quite inconspicuous. The anterior loop is usually completely closed, a narrow isthmus being here visible in but one specimen. M_3 is very short, consisting of three loops. On the inner side it shows two salient angles with one central fold, on the outer side there are three salient angles and two folds, the anterior one of the latter being, however, barely distinguishable. The first loop is usually completely delimited, being united with the second one by a narrow isthmus in one specimen only. Two further loops in M_3 are broadly confluent, in one specimen they are separated by a narrowing.

One of the mandibles with preserved M_1-M_2 belonged to a senile individual. Its teeth are worn off down to the coronal base. M_1 shows a uniform surface of cement fringed by a belt of enamel. In M_2 there are two confluent loops, on the surface of the posterior loop an enamel islet is poorly indicated.

Dimensions (in mm):

Mandibles	*1*	*2*	*3*	*4*	*5*	*6*	*7*
mandibular length	13.3	13.5	13.7	—	13.9	—	—
length M_1 — M_3	3.6	3.6	3.6	—	—	—	—
,, M_1	1.4	1.5	1.25	1.5	—	1.4	1.4
breadth M_1	0.75	0.8	0.9	0.9	—	0.75	0.8
length of M_2	1.1	1.1	1.1	1.2	—	1.1	—
,, M_3	1.0	1.0	1.0	—	1.0	—	—
height of mandible between M_1 — M_2	2.2	2.2	2.4	2.2	2.2	2.2	
thickness of same	1.6	1.7	1.7	1.5	1.6	1.5	—

Systematic position. — The here described Podlesice specimens agree well with the description of the species *Baranomys lóczyi* Kormos, established by T. Kormos (1933) on one incomplete mandible collected from „Preglacial" beds at Csarnota in Hungary. In the opinion of T. Kormos, this species displays a structure intermediary between that of Cricetinae and Microtinae. Its bunodontism and length of roots suggest appartenance with the Cricetinae, while the arrangement of the enamel loops one with the Microtinae. A detached molar of *Baranomys lóczyi* Kormos was collected at Gundersheim in Germany (F. Heller, 1936*a*). One year after that, on evidence of a single M_1 from the cave of Wojcieszów in the Sudeten, F. Heller (1937) described *Baranomys langenhani* Heller as a new species of genus *Baranomys* Kormos. The characters distinguishing the new species from *B. lóczyi* Kormos were said to consist in the presence of an enamel islet on the surface of the first loop, a more extensive rounding of the loop and the broad confluency of the first loop with the further triangles. As is shown by the here above described Podlesice material, all these characters display such extensive variations that this differentiation is not based on any sound evidence. *Baranomys langenhani* Heller must, therefore, be regarded as synonymous with *B. lóczyi* Kormos. And thus, this species which is the sole representative of genus *Baranomys* Kormos, occurs in early Pleistocene and possibly also late Pliocene beds in Hungary, Poland (the Sudeten and the Cracow-Wieluń Highland), also Germany.

In 1924 the species *Sigmodon atavus* Schlosser was described by M. Schlosser from Pontian beds of Ertemte in Mongolia. G. S. Miller (1927), when revising Schlosser's determination, proved this fossil rodent not to be related with the living American genus *Sigmodon* Say & Ord, and asserted the need for placing it as a separate genus which he named *Microtodon* Miller. S. Schaub (1934) gives a more detailed description of species *Microtodon atavus* (Schlosser) and separates from it fossil remains incorrectly referred to this form by earlier investigators. From Schaub's figures and description (1934) it is to be inferred that the molars of this species are strikingly similar to the teeth of *Baranomys lóczyi* Kormos. They only noticeable difference are the larger dimensions of *Microtodon atavus* (Schlosser). The separation, therefore, of genus *Baranomys* Kormos from *Microtodon* Miller does not appear as justifiable. Still it is difficult to arrive at a decision in this matter without orginal material of the Asiatic form. In their monograph on the molars of the Simplicidentatae H. G. Stehlin and S. Schaub (1951) mention both the cited genera as representatives of the Cricetidae with microtoidal tooth structure and uncertain systematic position.

M. Kretzoi (1955) creates a new subfamily Baranomyinae within the Arvicolidae to which it refers the genera *Baranomys* Kormos and *Microtodon* Miller.

Family **Muridae** Gray, 1821
Subfamily **Murinae** Murray, 1886
Genus *Parapodemus* Schaub, 1938
Parapodemus coronensis Schaub, 1938

(pl. IV, fig. 6; text-fig. 2 g, h)

1938. *Parapodemus coronensis* n. sp.; S. Schaub, Tertiäre und quartäre Murinae, p. 37, fig. 17c.

Material. — Fragment of maxilla with all the molars, showing rather strong wear, two damaged mandibles with M_1-M_2, a damaged mandible with M_1 and M_3, two badly damaged mandibles with M_1, four damaged mandibles without dentition, three detached M_1.

Description. — In M^1 the confluent cusps 1, 2 and 3 (the notation here used is that adapted in the pattern from Schaub's paper of 1938) form an unsymmetrically developed arch, since cusp 1 has been strongly pushed backwards and passes caudally into a narrow crest. Cusp 7 is not developed. On the labial side, beyond cusps 6 and 9, an accessory cusp is developing, separated from cusp 9 by a notch extending far to the centre of the tooth. Terminal cingulum is poorly developed.

M^2 is broad and short. The anterior accessory tubercles are fairly well developed, the lingual is larger. Beyond these has been formed a uniform wreath of confluent tubercles. Tubercle 4 is pushed to the back. Tubercle 7 is wanting. On the labial side, beyond cusps 6 and 9, has developed, as in the first molar, a conspicuous accessory tubercle. In the hind part of the tooth the cingulum is weak.

M^3 has developed similarly as in *Apodemus sylvaticus* (Linnaeus). Anteriorly, on the lingual side, there is a strong asymmetric cusp. Beyond it the further tubercles united into one uniform loop with two digitations on the lingual side. On the labial side a thickening is distinguishable on the enamel, corresponding to the worn apex of the tubercle.

The mandible is slight and delicate, much more so than in *Apodemus sylvaticus* (Linnaeus). The height of the mandibular ramus below the molars is not great. In M_1 the unpaired anterior cusp is rather poorly developed. It may occur isolated, but more often is confluent with the pair of the next cusps. The two next pairs of cusps are usually united by a narrow pass. On the lingual side there usually occur three accessory cusps showing different stages of development, sometimes only just distinguishable on the cingulum, elsewhere quite conspicuous. The last

most caudal cusp is always the strongest. The posterior pair of tubercles and the unpaired terminal tubercle have developed as in *Apodemus* Kaup.

In M_2 the two transverse ridges form an angle more obtuse than that in *A. sylvaticus* (Linnaeus). On the labial side of the second ridge there is a strong accessory tubercle which becomes confluent with the ridge when rather badly worn. The unpaired terminal cusp is very poorly developed, shaped as a flattened oval.

M_3 is with two transverse ridges. The first of these has a but indistinct notch on the caudal side, the second is simple. Both are clearly asymmetric.

Dimensions. The only preserved fragment of the maxilla shows the following dimensions (in mm): length of the molar tooth-row 3.5; length of M^1 1.75, breadth of M^1 1.0; length of M^2 1.2; length of M^3 0.8.

Mandibles	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
mandibular length	13.5	—	—	—	—	—	—	
length of molar tooth-row	3.5	—	—	—	—	—	—	—
,, M_1	1.6	1.7	1.4	1.7	1.4	1.6	1.5	1.4
breadth of M_1	0.9	0.9	0.75	1.0	0.8	1.0	1.0	0.75
length of M_2	—	—	1.0	—	—	1.2	—	—
,, M_3	0.76	—	—	—	—	—	—	—
height of mandibular ramus between M_1 and M_2	2.2	2.25	2.0	—	—	2.2	—	2.2
thickness of mandible between M_1 and M_2	1.4	1.4	1.3	—	—	1.45	—	1.4

Systematic position. — The structure of the molars, particularly those of the upper jaw, agrees perfectly with the definition of genus *Parapodemus* Schaub. From *Apodemus* Kaup, a related genus common in the recent fauna of Asia and Europe, but already recorded from the early Pleistocene, *Parapodemus* Schaub differs in the absence of cusp 7 on the two first molars of the upper jaw. Moreover, this genus is distinguished by the presence of an accessory tubercle on the labial side at the posterior margin of M^1 and M^2, by flatness of form and weaker development of the terminal unpaired tubercle on M_2, finally by additional less conspicuous features.

Genus *Parapodemus* Schaub contains, as a generic type, the species *P. schaubi* Papp. This species was described by S Schaub (1938) on fossil remains from Polgardi in Hungary, but that writer believed the remains studied by him to belong to a species known as *Mus gaudryi* Dames, and thence called it *Parapodemus gaudryi* (Dames) A. Papp (1947) has

proved that the remains of *Mus gaudryi* Dames, recovered from Pliocene beds of Pikermi and Samos, differ from those described by S. Schaub and he therefore changed the name of the form described by S. Schaub (1938) to *Parapodemus schaubi* Papp, retaining the name of „*Mus*" *gaudryi* Dames for the remains from Greece. Their generic identity cannot be more closely determined owing to their fragmentary condition. We must, therefore, retain their generic name of *Mus* Linnaeus. By its size „*Mus*" *gaudryi* Dames comes near the here described Podlesice form, differing from it in another form of the second transverse cusp in M_3 and in structure of M_2. The Pleistocene *Parapodemus schaubi* Papp from Polgardi is of considerably larger size than the here described Podlesice remains, which it does indeed approach very closely in structure of molars. Other Pliocene species of genus *Parapodemus* Schaub, described by S. Schaub (1938) from western Europe and Mongolia (Ertemte), are also of larger size than the Podlesice remains. Fully agreeing with them in dimensions are, on the other hand, the remains of *P. coronensis* Schaub from Brasso in Rumania, found in an early Pleistocene faunistic assemblage, probably referable to the Mindel glaciation period. *Parapodemus coronensis* Schaub has thus far been recorded on evidence of a fragment of maxilla with M^1 and M^2, but the structure of these two teeth agrees perfectly with those of the Podlesice remains.

Family **Gliridae** Thomas, 1897
Subfamily **Glirinae** Thomas, 1897
Genus *Glis* Brisson, 1762
Glis sackdillingensis Heller, 1930
Glis sackdillingensis minor n. subsp.

(pl. IV, fig. 8; text-fig. 2 f)

Holotype. — Incomplete mandible with P_4 and M_1.
Stratum typicum. — Günz-Mindel Interglacial.
Locus typicus. — Podlesice near Kroczyce, Olkusz district.
Derivatio nominis. — *minor*-smaller than the type form.

Material. — Right mandibular ramus with damaged processes and with the lower fourth premolar and first molar. Also a detached M^1.

Description. — M^1 displays similar extent of dental wear and condition of preservation as the type mandible described here below, it, therefore, probably belongs to the same individual. It possesses three roots; a thick one on the lingual side and two weaker on the labial side. The four chief ridges of enamel run slightly obliquely, being bent lingually backwards. The accessory ridges are markedly less worn than the upper ridges which indicates their small height.

The mandible does not display any differences of morhology as against the mandible of *Glis glis* (Linnaeus), being only distinguished by considerably smaller dimensions.

P_4 is with basal ridges strongly developed. They have an arcuate course, the central layer being particularly curved backward in its median portion. Owing to rather strong tooth wear of the studied specimen the central and posterior ridges have the appearance of double skein of enamel separated by a skein of dentine. The accessory ridges are poorly developed.

M^1 is with the posterior ridge rather less well developed than the remaining cardinal ridges, without, however, showing signs of reduction. Three further basal ridges run almost perpendicular to the mandibular axis. Owing to wear they duplicate. The accessory ridges are probably somewhat less well developed than those in *Glis glis* (Linnaeus). The M_3 alveolars indicate lack of any extensive reduction in this tooth.

Dimensions (in mm):

height of mandible between P_4 and M_1	4.5	large diameter of incisor at base of enamel	2.0
thickness there	2.0	small diameter at same point	1.0
length of mandibular tooth-row (partly measured on alveoles)	5.6	length of P_4	0.95
length of diastema	4.0	„ M_1	1.5
		breadth of M_1	2.5
		length of M^1	1.5
		breadth of M^1	1.6

Systematic position. — The structure of teeth and of the mandibular ramus suggests that the collected remains are referable to *Glis* Brisson, 1762. The genus is represented in the living fauna by one species only, namely *Glis glis* (Linnaeus), whose fossil remains have already been recorded from the early Pleistocene. The above described Podlesice remains differ from *Glis glis* (Linnaeus) foremost by their considerably smaller dimensions, to say, after G. S. Miller (1912), length of the lower molar tooth-row is from 6.6 to 8.2 mm in living specimens, while in our form it is 5.6 mm.

From younger Pleistocene beds, fossil forms have been recorded belonging to genus *Glis* Brisson, namely *G. glis süssenbornensis* Soergel, *G. antiquus* Kormos, *G. hofmanni* Kormos *(nomen nudum)* and *G. sackdillingensis* Heller. *G. glis süssenbornensis* Soergel, described from Süssenborn in Germany (W. Soergel, 1919), shows the same dimensions as those in the living species, but it is distinguished by the reduction of its anterior ridges on M_1 and M_2. Both their size and the lack of reduction as here mentioned in the Podlesice specimens prevent their assignment to this form.

Glis antiquus Kormos, described by T. Kormos (1930*a*) from the „Preglacial" of Hungary, and subsequently mentioned by M. Kretzoi (1938) as *G. glis antiquus* Kormos, differs from the living form in its smaller dimensions (length of lower molar tooth-row being from 6.2 to 7.0 mm), reduction in M_3 and the presence of two roots only in P_4. Thus this form also differs from the Podlesice remains by its larger size. The species *Glis hofmanni* is mentioned by T. Kormos (1937*a*) without any description.

In 1930 F. Heller described the subspecies *G. glis sackdillingensis* Heller from the early Pleistocene of the Sackdillinger Höhle in Germany. In 1933, upon acquirement of further materials, F. Heller raised this form to the rank of species. Its characters are as follows: smaller dimensions (length of lower molar tooth-rows is from 5.9 to 6.4 mm), tendency to the accessory ridges being reduced in M_3 and more particularly so in P_4, also curving of the central basal ridge in P_4 stronger than in *G. glis* (Linnaeus).

The Podlesice form agrees with *G. sackdillingensis* Heller as respects the curving of the central ridge in P_4 and weak development of the accessory ridges. Its dimensions, however, are distinctly smaller than all the corresponding dimensions of specimens from Germany, which strongly suggests its establishment as a separate subspecies. It is in fact the smallest form of genus *Glis* Brisson thus far recorded from Pleistocene beds.

A mandible belonging to genus *Glis* Brisson, smaller than any mandible of this genus so far recorded, was in 1940 descibed by T. Kormos from Villany in Hungaria. T. Kormos (1940) gives its description and dimensions, but owing to the fragmentary condition of the specimen he does not give it a systematic name. The dimensions of the Villany specimen are almost identical with those of *Glis sackdillingensis minor* n. subsp., so that it may, with great probability, be referred to this subspecies.

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Kraków, August 1956

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KAZIMIERZ KOWALSKI

OWADOŻERNE, NIETOPERZE I GRYZONIE WCZESNOPLEJSTOCEŃSKIEJ BREKCJI KOSTNEJ Z PODLESIC KOŁO KROCZYC

Streszczenie

Opisywane tutaj szczątki kostne ssaków znalezione zostały w miejscowości Podlesice koło Kroczyc w pow. Olkuskim, w połowie długości Wyżyny Krakowsko-Wieluńskiej. Wydobyto je z brekcji kostnej, która wypełniała otwarte u góry, lejkowate zagłębienie krasowe. Charakter litologiczny brekcji wskazuje, że jest ona sfosylizowanym namuliskiem jaskiniowym. Zawarte w brekcji kości pochodzą z dwu źródeł: częściowo są to kości nietoperzy, które tworzyły liczną kolonię przy stropie jaskini, częściowo zaś resztki zrzutek sów. Kolonia nietoperzy, której szczątki znajdujemy w Podlesicach, była kolonią zimową. Składała się ona z kilku gatunków nietoperzy, przeważnie należących do rodzaju *Myotis* Kaup. Oprócz opisanych w niniejszej pracy szczątków drobnych ssaków, znaleziono w brekcji nieliczne resztki nie oznaczonych bliżej Mustelidae, kości ptaków i szczękę *Lacerta* sp.

Sytuacja geologiczna brekcji wskazuje na to, że pochodzi ona sprzed zlodowacenia Mindel. Dokładniejsze datowanie umożliwia poznanie składu faunistycznego, który przedstawia się następująco:

Insectivora

Talpa minor Freudenberg
Desmana nehringi Kormos
Sorex alpinoides n. sp.
S. dehneli n. sp.
S. cf. *praearaneus* Kormos
Sorex sp.
Petenyia hungarica Kormos
Soriculus kubinyi Kormos
Suncus cf. *pannonicus* (Kormos)

Chiroptera

Rhinolophus cf. *ferrumequinum* (Schreber)
Miniopterus schreibersi (Kuhl)
Plecotus crassidens Kormos
Myotis podlesicensis n. sp.
M. cf. *aemulus* Heller
M. dasycneme subtilis n. subsp.
M. danutae n. sp.
M. cf. *exilis* Heller

Rodentia

Mimomys cf. *pusillus* (Méhely)
Baranomys lóczyi Kormos
Parapodemus coronensis Schaub
Glis sackdillingensis minor n. subsp.

Na 20 oznaczonych gatunkowo form, tylko dwie — *Rhinolophus ferrumequinum* (Schreber) i *Miniopterus schreibersi* (Kuhl) — są prawdopodobnie identyczne z gatunkami żyjącymi do dziś. Pozostałe są albo nowe dla nauki (*Sorex alpinoides* n. sp., *S. dehneli* n. sp., *Myotis podlesicensis* n. sp., *M. danutae* n. sp., *M. dasycneme subtilis* n. subsp., *Glis sackdillingensis minor* n. subsp.), albo znane są z innych faun kopalnych wczesnego plejstocenu Europy środkowej. Porównanie fauny z Podlesic z innymi faunami drobnych ssaków wczesnego plejstocenu wskazuje na to, że pochodzi ona z interglacjału Günz-Mindel.

Fauna z Podlesic zawiera niektóre elementy archaiczne, plioceńskie, które przeżywają schyłek swego istnienia w interglacjale Günz-Mindel. Do takich należą: *Baranomys lóczyi* Kormos, znany dotychczas z trzech znalezisk w Europie środkowej i blisko spokrewniony z *Microtodon atavus* (Schlosser) z pontu Mongolii, oraz *Parapodemus coronensis* Schaub, należący do rodzaju licznego w pliocenie a ginącego we wczesnym plejstocenie. Interesującą formą jest również *Plecotus crassidens* Kormos, który wykazuje podobieństwo z amerykańskim rodzajem *Corynorhinus* Allen i który, być może, reprezentuje w faunie interglacjału Günz-Mindel Europy element amerykański, analogiczny do amerykańskiego elementu we florze tego okresu. Fauna z Podlesic wykazuje, jako całość, ścisłe analogie z faunami tego samego okresu ze środkowej Europy (Węgry, Rumunia, południowa i zachodnia część Niemiec). Wskazuje ona na klimat umiarkowany, nieco cieplejszy od dzisiejszego, i na roślinność typu leśnego.

Część szczegółowa pracy zawiera opisy wszystkich znalezionych gatunków ssaków, wymiary ich szczątków i uwagi systematyczne. Znalezione materiały przyczyniają się do lepszego poznania niektórych form, znanych dotychczas z izolowanych szczątków. Dokładniejsze zbadanie zmienności gatunku *Baranomys lóczyi* Kormos pozwoliło wykazać, że gatunek *B. langenhani* Heller jest jego synonimem.

OBJAŚNIENIA DO ILUSTRACJI

Fig. 1 (p. 345)

Powierzchnia wyrostków stawowych żuchwy *(processus articularis)*; *a Sorex* cf. *praeraneus* Kormos, *b Petenyia hungarica* Kormos, *c Sorex dehneli* n. sp., *d Sorex alpinoides* n. sp., *e Suncus* cf. *pannonicus* (Kormos).

Fig. 2 (p. 377)

Powierzchnia zębów trzonowych. *Mimomys* cf. *pussilus* (Méhely): *a* lewa połowa żuchwy (M_1-M_3), *b-c* prawa połowa żuchwy (M_1-M_2), *d* M^1, *e* M^2; *Glis sackdillingensis minor* n. subsp.: *f* P_4-M_1; *Parapodemus coronensis* Schaub: *g* M_1-M_3, *h* M^1-M^3; *Baranomys lóczyi* Kormos: *i-j* lewa połowa żuchwy (M_1-M_3), *k* prawa połowa żuchwy (M_1-M_2), *l* prawa M_1-M_2 osobnika bardzo starego, *m* M_1, *n* M_3.

Pl. I

Fig. 1. *Talpa minor* Freudenberg; fragment żuchwy *a* od wewnątrz, *b* z góry; × 4.

Fig. 2. *Desmana nehringi* Kormos; fragment żuchwy z P_2 i P_4-M_2 *a* z zewnątrz, *b* z góry; × 4.

Fig. 3. *Desmana nehringi* Kormos; fragment szczęki z P^4 i M^1 *a* z zewnątrz, *b* od wewnątrz; × 4.

Fig. 4. *Sorex* cf. *praearaneus* Kormos; żuchwa *a* z zewnątrz, *b* z góry; × 4.

Fig. 5. *Sorex dehneli* n. sp.; fragment żuchwy (holotyp) bez wyrostków stawowych *a* od wewnątrz, *b* z góry, *c* z zewnątrz; × 4.

Fig. 6. *Sorex dehneli* n. sp.; fragment żuchwy (z wyrostkami stawowymi) i z M_1-M_3 *a* z zewnątrz, *b* z góry, *c* od wewnątrz; × 4.

Fig. 7. *Sorex alpinoides* n. sp.; żuchwa (holotyp) *a* od wewnątrz, *b* z góry, *c* z zewnątrz; × 4.

Fig. 8. *Sorex alpinoides* n. sp.; część rostralna czaszki *a* z góry, *b* z boku, *c* z dołu; × 4.

Fig. 9. *Petenyia hungarica* Kormos; żuchwa (bez wyrostków stawowych) *a* z zewnątrz, *b* z góry; × 4.

Fig. 10. *Petenyia hungarica* Kormos; żuchwa z zewnątrz (z wyrostkami stawowymi) i M_1-M_3; × 4.

Pl. II

Fig. 1. *Sorex* sp.; fragment żuchwy *a* z zewnątrz, *b* z góry; × 6,6.

Fig. 2. *Suncus pannonicus* (Kormos); żuchwa *a* z zewnątrz, *b* z góry; × 4.

Fig. 3. *Soriculus kubinyi* Kormos; fragment żuchwy *a* z zewnątrz, *b* z góry; × 4.

Fig. 4. *Miniopterus schreibersi* Kuhl; żuchwa *a* z zewnątrz, *b* z góry; × 4.

Fig. 5. *Rhinolophus ferrumequinum* (Schreber); żuchwa *a* z zewnątrz, *b* z góry; × 4.

Fig. 6. *Rhinolophus ferrumequinum* (Schreber); część rostralna czaszki *a* z dołu, *b* z boku; × 4.

Fig. 7. *Myotis podlesicensis* n. sp.; żuchwa (holotyp) *a* z zewnątrz, *b* z góry, *c* od wewnątrz; × 4.

Fig. 8. *Myotis podlesicensis* n. sp.; czaszka *a* z boku, *b* z dołu; × 4.

Pl. III

Fig. 1. *Plecotus crassidens* Kormos; *a* czaszka z boku, *b* część rostralna czaszki z dołu; × 4.

Fig. 2. *Plecotus crassidens* Kormos; żuchwa (z zachowanymi P_4 i M_1) *a* z zewnątrz, *b* z góry; × 4.

Fig. 3. *Myotis dasycneme subtilis* n. subsp.; żuchwa (holotyp) *a* z zewnątrz, *b* z góry; × 4.

Fig. 4. *Myotis dasycneme subtilis* n. subsp.; część rostralna czaszki *a* z boku, *b* z dołu; × 4.

Fig. 5. *Myotis* cf. *aemulus* Heller; żuchwa *a* z zewnątrz, *b* z góry; × 4.

Fig. 6. *Myotis* cf. *aemulus* Heller; czaszka *a* z boku, *b* z dołu; × 4.

Pl. IV

Fig. 1. *Myotis danutae* n. sp.; żuchwa (holotyp) *a* z zewnątrz, *b* z góry, *c* od wewnątrz; × 4.

Fig. 2. *Myotis danutae* n. sp.; część rostralna czaszki *a* z boku, *b* z dołu; × 4.

Fig. 3. *Myotis* cf. *exilis* Heller; żuchwa *a* z zewnątrz, *b* z góry; × 4.

Fig. 4. *Myotis* cf. *exilis* Heller; czaszka *a* z boku, *b* z dołu; × 4.

Fig. 5. *Baranomys lóczyi* Kormos; żuchwa z boku, × 4.
Fig. 6. *Parapodemus coronensis* Schaub; żuchwa z boku, × 4.
Fig. 7. *Mimomys* cf. *pussilus* (Méhely); żuchwa z boku, × 4.
Fig. 8. *Glis sackdillingensis minor* n. subsp.; żuchwa (holotyp) z boku, × 4.

КАЗИМЕРЖ КОВАЛЬСКИ

НАСЕКОМОЯДНЫЕ, ЛЕТУЧИЕ МЫШИ И ГРЫЗУНЫ НИЖНЕ-ПЛЕЙСТОЦЕНОВОЙ КОСТНОЙ БРЕКЧИИ ИЗ ПОДЛЕСИЦ ОКОЛО КРОЧИЦ (ПОЛЬША)

Резюме

Описываемые здесь костные остатки млекопитающих были найдены в местности Подлесице около Крочиц в Олькушском уезде, в половине длины Краковско-Велюньской Возвышенности. Они залегали в костной брекчии, которая заполняла воронкообразное карстовое углубление открытое кверху. Литологический характер брекчии указывает на то, что она представляет собой фоссилизированный наносный пещерный ил. Кости, которые содержит брекчия, происходят из двух источников: частично это кости летучих мышей, образовавших некогда богатую колонию у свода пещеры, отчасти же — отбросы пищи сов. Колония летучих мышей, остатки которых находятся в Подлесицах, была зимней колонией. Она состояла их нескольких видов летучих мышей, принадлежавших преимущественно к роду *Myotis* Kaup. Рядом с описанными в статье остатками мелких млекопитающих были найдены в брекчии немногочисленные остатки ближе не определенных Mustelidae, кости птиц и челюсть *Lacerta* sp.

Геологическая позиция брекчии указывает, что она была отложена в период предшествующий оледенению Миндель. Более точное датирование возможно в результате определения ее фаунистического состава, который представляется следующим образом:

Insectivora

Talpa minor Freudenberg
Desmana nehringi Kormos
Sorex alpinoides n. sp.
S. dehneli n. sp.
S. cf. *praearaneus* Kormos
Sorex sp.
Petenyia hungarica Kormos
Soriculus kubinyi Kormos
Suncus cf. *pannonicus* (Kormos)

Chiroptera

Rhinolophus cf. *ferrumequinum* (Schreber)
Miniopterus schreibersi (Kuhl)
Plecotus crassidens Kormos
Myotis podlesicensis n. sp.
M. cf. *aemulus* Heller
M. dasycneme subtilis n. subsp.
M. danutae n. sp.
M. cf. *exilis* Heller

Rodentia

Mimomys cf. *pusillus* (Méhely)
Baranomys lóczyi Kormos
Parapodemus coronensis Schaub
Glis sackdillingensis minor n. subsp.

Из 20-ти видово определенных форм, только две — *Rhinolophus ferrumequinum* (Schreber) и *Miniopterus schreibersi* (Kuhl) — вероятно тождественны видам живущим до ныне. Остальные либо новы для науки (*Sorex alpinoides* n. sp., *S. dehneli* n. sp., *Myotis podlesicensis* n. sp., *M. danutae* n. sp., *M. dasycneme subtilis* n. subsp., *Glis sackdillingensis minor* n. subsp.), либо известны из других ископаемых фаун раннего плейстоцена средней Европы. Сравнение фауны из Подлесиц с другими фаунами мелких млекопитающих раннего плейстоцена указывает на ее происхождение из интергляциала Гюнц—Миндель.

Фауна из Подлесиц содержит некоторые древние элементы плиоцена, которые переживают закат своего существования в интергляциале Гюнц—Миндель. К ним принадлежат: *Baranomys lóczyi* Kormos, известный до сих пор из трех местностей в средней Европе, а близкий родственник *Microtodon atavus* (Schlosser) из понтического яруса Монголии, далее *Parapodemus coronensis* Schaub, который принадлежит роду многочисленному в плиоцене, а исчезающему в раннем плейстоцене. Интересной формой является также *Plecotus crassidens* Kormos, который проявляет сходство с американским родом *Corynorhinus* Allen и который, быть может, представляет в фауне интергляциала Гюнц—Миндель Европы американский элемент, аналогично американскому элементу представленному во флоре этого периода. Как целость, фауна из Подлесиц проявляет тесные аналогии с одновременными фаунами средней Европы (Венгрия, Румыния, южная и западная часть Германии). Она указывает на умеренный климат, несколько более теплый чем современный, и на растительность лесного характера.

Специальная часть статьи содержит описание всех найденных видов млекопитающих, размеры их остатков и систематические замечания. Найденные материалы позволяют лучше ознакомиться с некоторыми формами, известными до сих пор лишь на основании изолированных остатков. Более детальное изучение изменчивости вида *Baranomys lóczyi* Kormos позволило доказать, что вид *B. langenhani* Heller является его синонимом.

Pl. I

Fig. 1. *Talpa minor* Freudenberg; fragment of mandible *a* inner view, *b* top view; × 4.
Fig. 2. *Desmana nehringi* Kormos; fragment of mandible with P_2 and P_4-M_2 *a* outer view, *b* top view; × 4.
Fig. 3. *Desmana nehringi* Kormos; fragment of maxilla with P^4 and M^1 *a* outer view, *b* inner view; × 4.
Fig. 4. *Sorex* cf. *praearaneus* Kormos; mandible *a* outer view, *b* top view; × 4.
Fig. 5. *Sorex dehneli* n. sp.; fragment of mandible (holotype) without processes *a* inner view, *b* top view, *c* outer view; × 4.
Fig. 6. *Sorex dehneli* n. sp.; fragment of mandible with processes and with M_1-M_3 *a* outer view, *b* top view, *c* inner view; × 4.
Fig. 7. *Sorex alpinoides* n. sp.; mandible (holotype) *a* inner view, *b* top view, *c* outer view; × 4.
Fig. 8. *Sorex alpinoides* n. sp.; rostral part of skull *a* top view, *b* side view, *c* bottom view; × 4.
Fig. 9. *Petenyia hungarica* Kormos; mandible (without processes) *a* outer view, *b* top view; × 4.
Fig. 10. *Petenyia hungarica* Kormos; outer view of mandible with processes and with M_1-M_3; × 4.

Pl. II

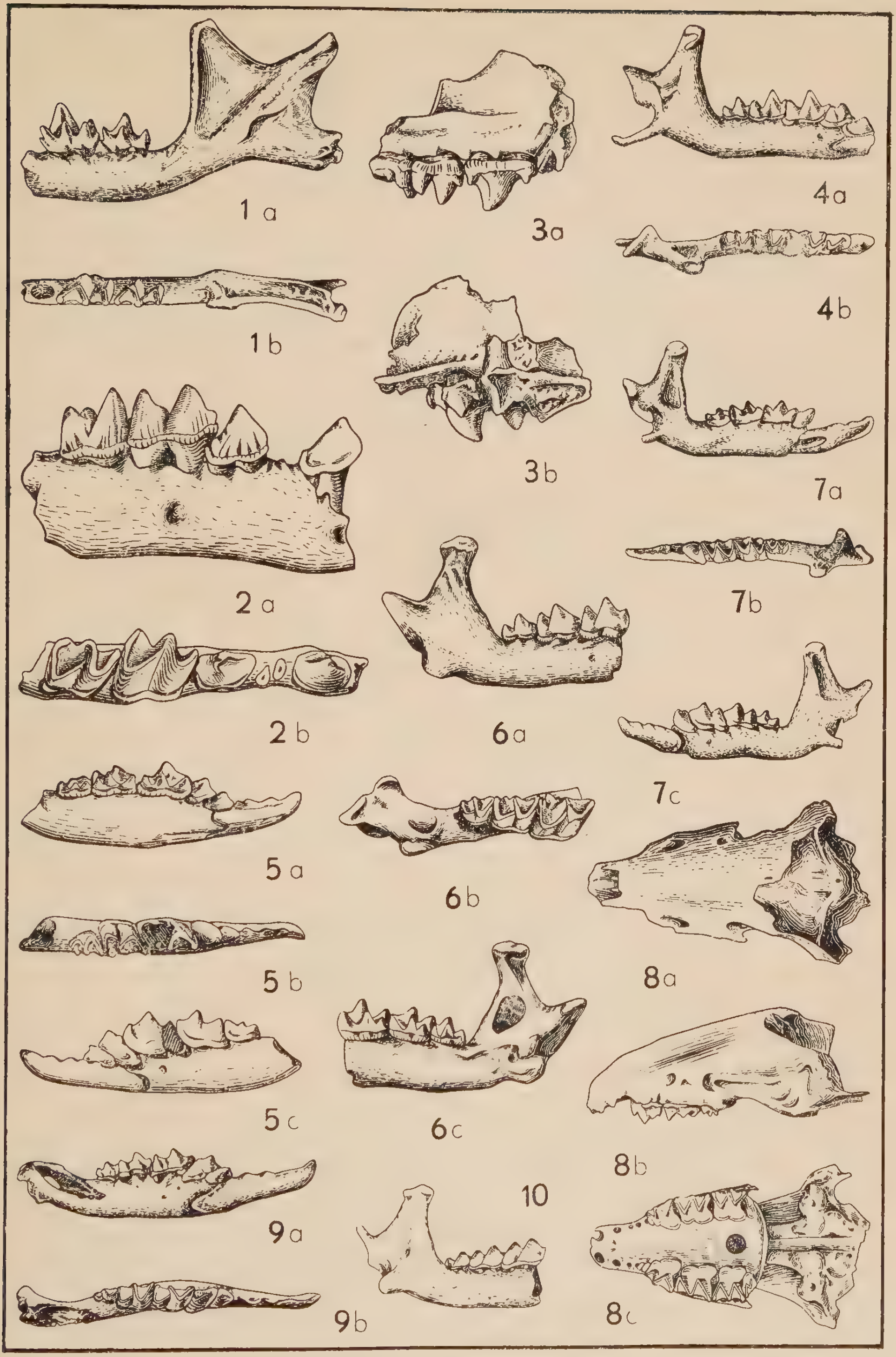
Fig. 1. *Sorex* sp.; fragment of mandible *a* outer view, *b* top view; × 6.6.
Fig. 2. *Suncus pannonicus* (Kormos); mandible *a* outer view, *b* top view; × 4.
Fig. 3. *Soriculus kubinyi* Kormos; fragment of mandible *a* outer view, *b* top view; × 4.
Fig. 4. *Miniopterus schreibersi* Kuhl; mandible *a* outer view, *b* top view; × 4.
Fig. 5. *Rhinolophus ferrumequinum* (Schreber); mandible *a* outer view, *b* top view; × 4.
Fig. 6. *Rhinolophus ferrumequinum* (Schreber); rostral part of skull *a* bottom view, *b* side view; × 4.
Fig. 7. *Myotis podlesicensis* n. sp.; mandible (holotype) *a* outer view, *b* top view, *c* inner view; × 4.
Fig. 8. *Myotis podlesicensis* n. sp.; skull *a* side view, *b* bottom view; × 4.

Pl. III

Fig. 1. *Plecotus crassidens* Kormos; *a* side view of skull, *b* bottom view of rostral part of skull; × 4,
Fig. 2. *Plecotus crassidens* Kormos; mandible (with preserved P_4 and M_1) *a* outer view, *b* top view; × 4.
Fig. 3. *Myotis dasycneme subtilis* n. subsp.; mandible (holotype) *a* outer view, *b* top view; × 4.
Fig. 4. *Myotis dasycneme subtilis* n. subsp.; rostral part of skull *a* side view, *b* bottom view; × 4.
Fig. 5. *Myotis* cf. *aemulus* Heller; mandible *a* outer view, *b* top view; × 4.
Fig. 6. *Myotis* cf. *aemulus* Heller; skull *a* side view, *b* bottom view; × 4.

Pl. IV

Fig. 1. *Myotis danutae* n. sp.; mandible (holotype) *a* outer view, *b* top view, *c* inner view; × 4.
Fig. 2. *Myotis danutae* n. sp.; rostral part of skull *a* side view, *b* bottom view; × 4.
Fig. 3. *Myotis* cf. *exilis* Heller; mandible *a* outer view, *b* top view; × 4.
Fig. 4. *Myotis* cf. *exilis* Heller; skull *a* side view, *b* bottom view; × 4.
Fig. 5. *Baranomys lóczyi* Kormos; side view of mandible; × 4.
Fig. 6. *Parapodemus coronensis* Schaub; side view of mandible; × 4.
Fig. 7. *Mimomys* cf. *pussilus* (Méhely); side view of mandible; × 4.
Fig. 8. *Glis sackdillingensis minor* n. subsp.; mandible (holotype) side view; 4.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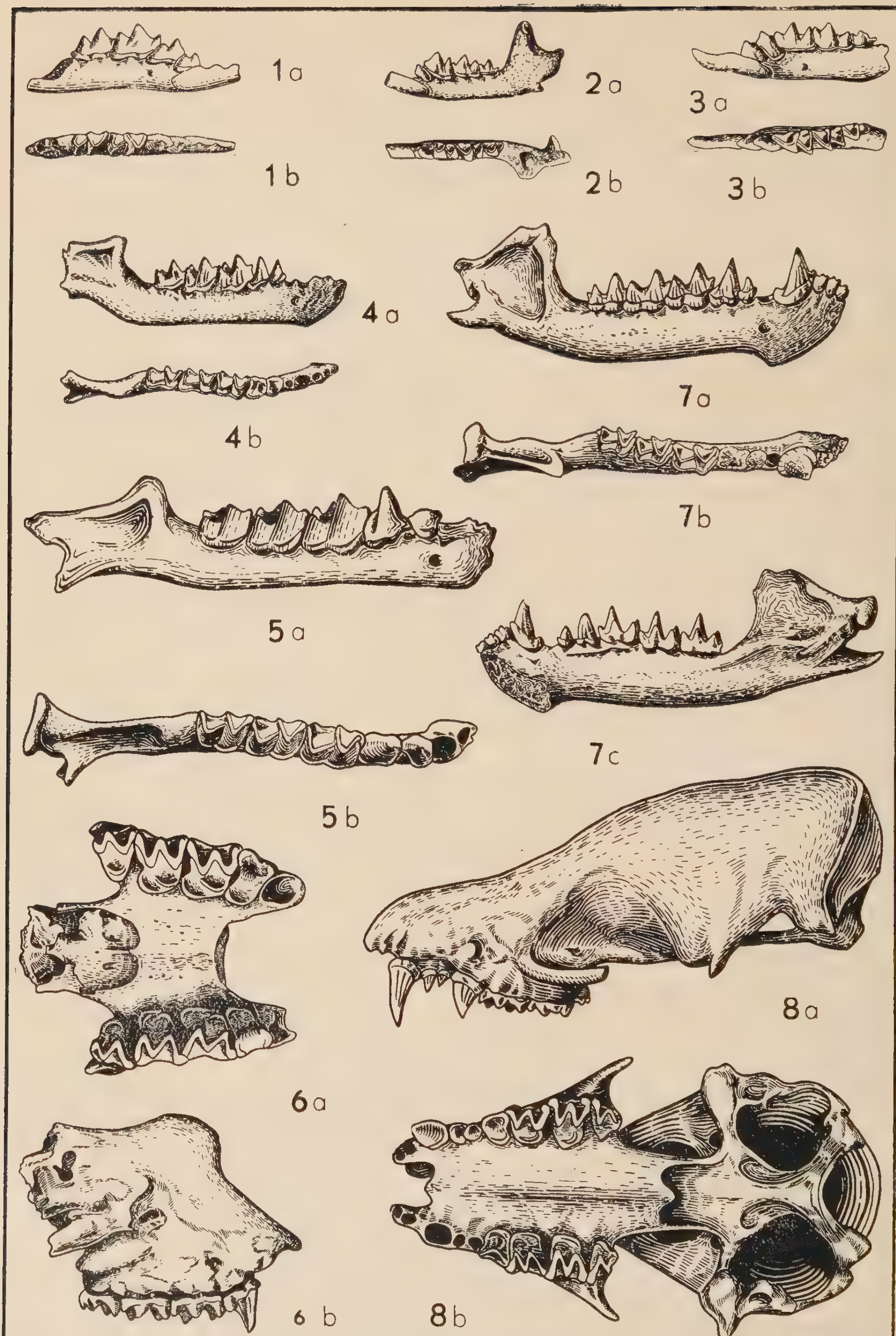
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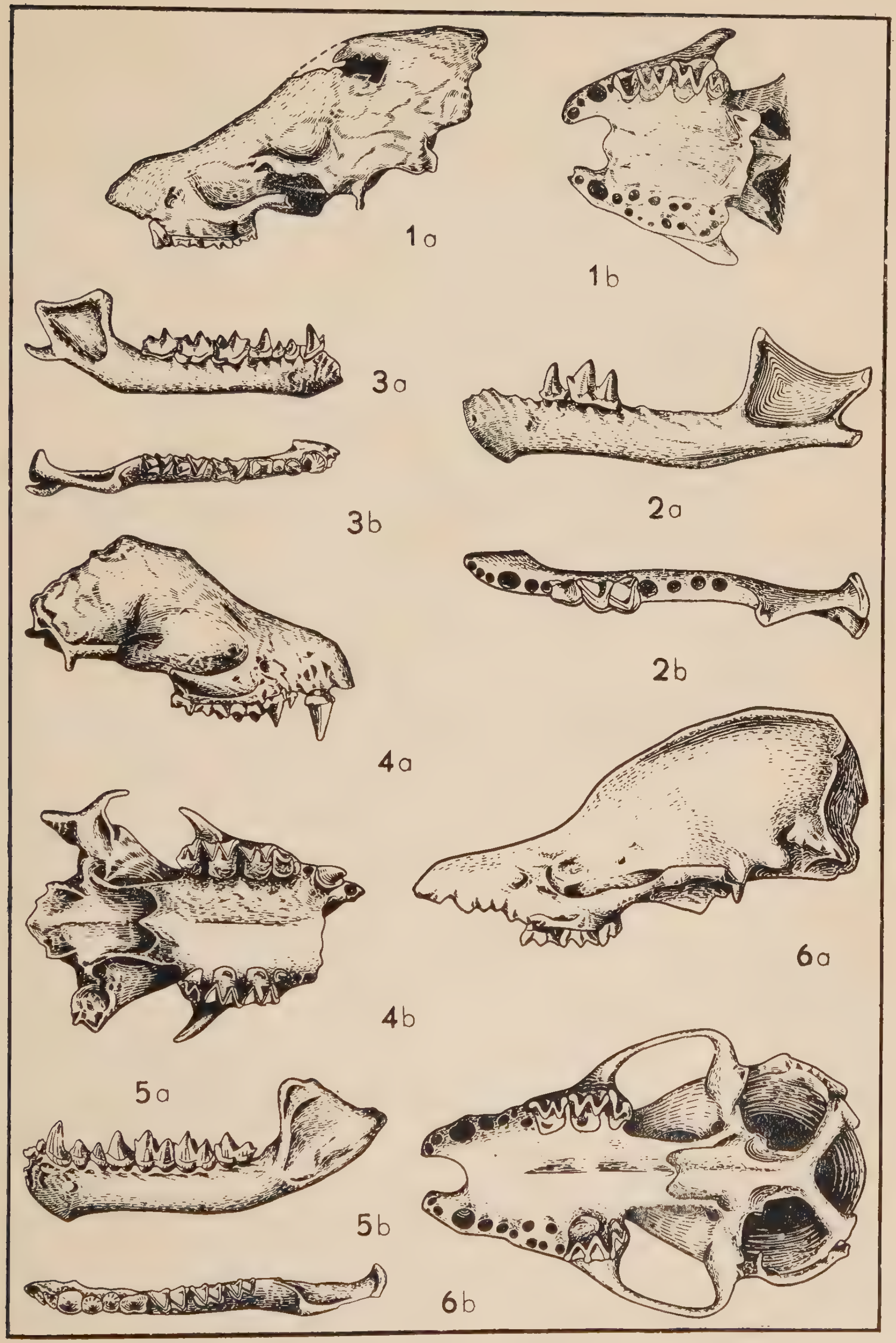
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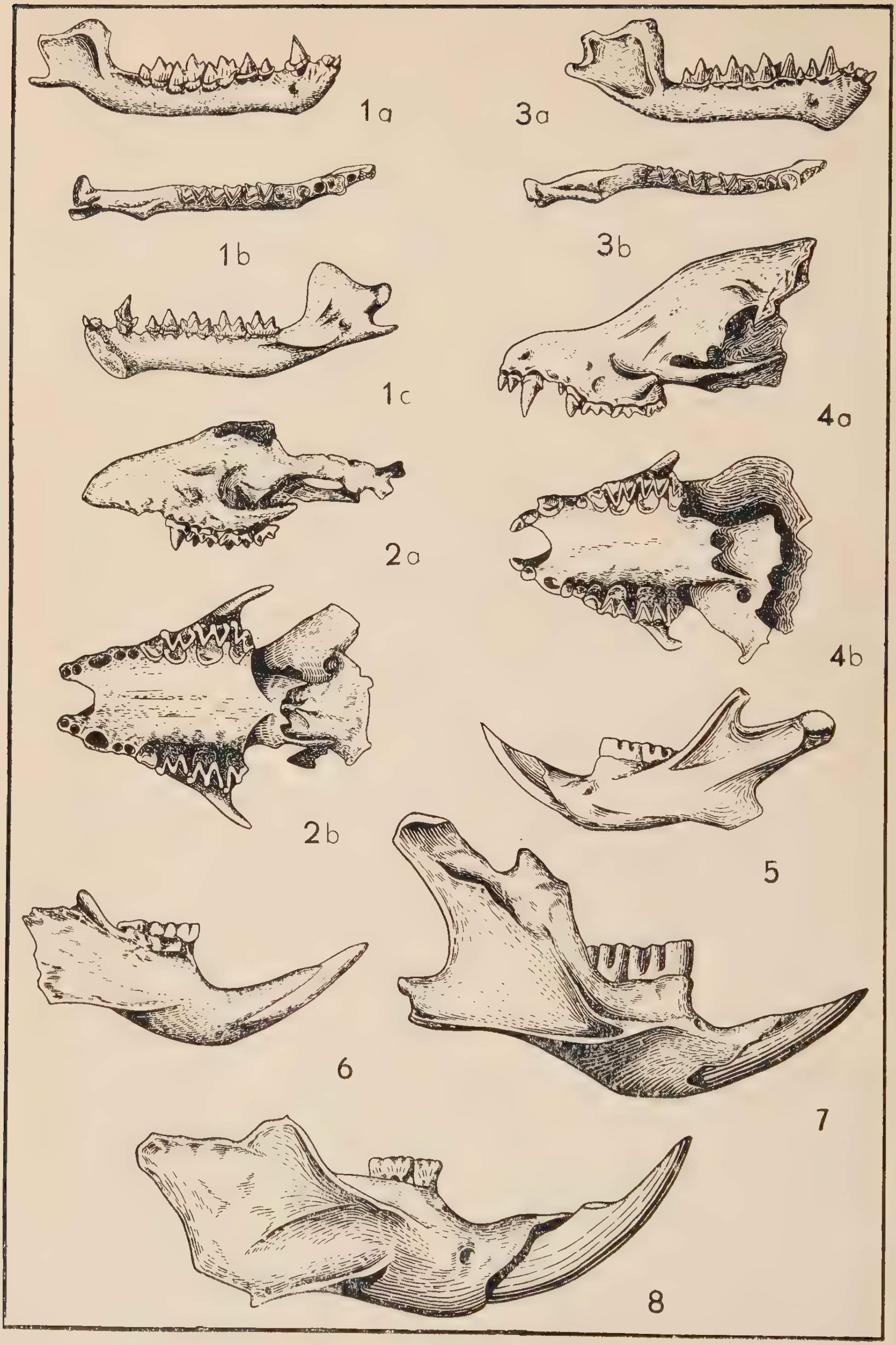
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